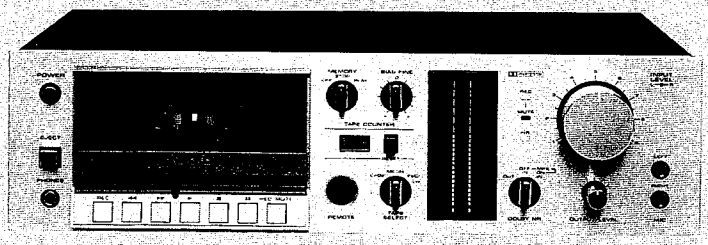
NIKKO DECK

ND-990

STEREO CASSETTE DECK



TYPE AND VOLTAGE

W-TYPE: UL & CSA type	120V AC
E-TYPE: NK-STD type	220V AC
B-TYPE: BS type	240V AC

SERVICE MANUAL

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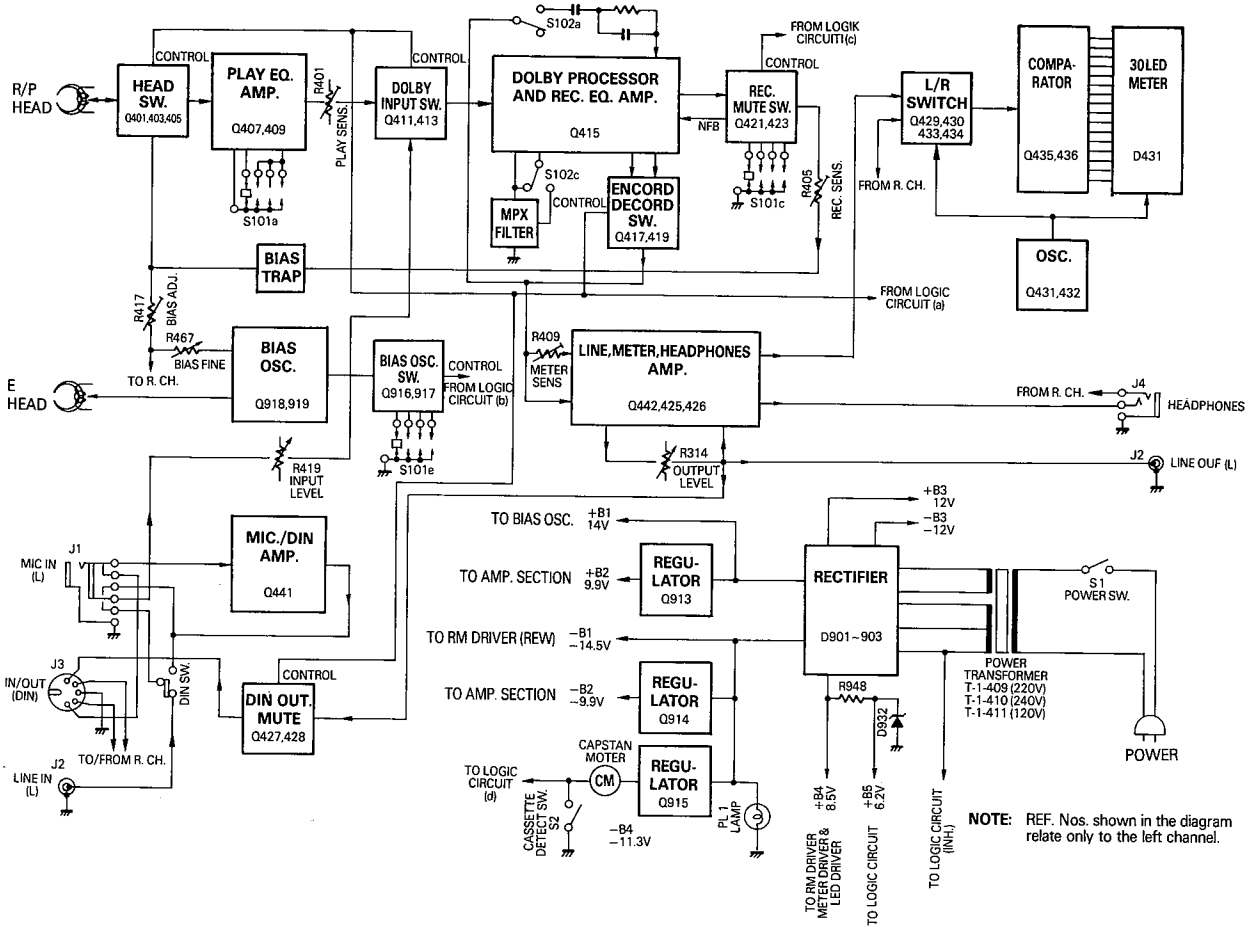
BLOCK DIAGRAM



NOTE: REF. Nos. shown in the diagram relate only to the left channel.

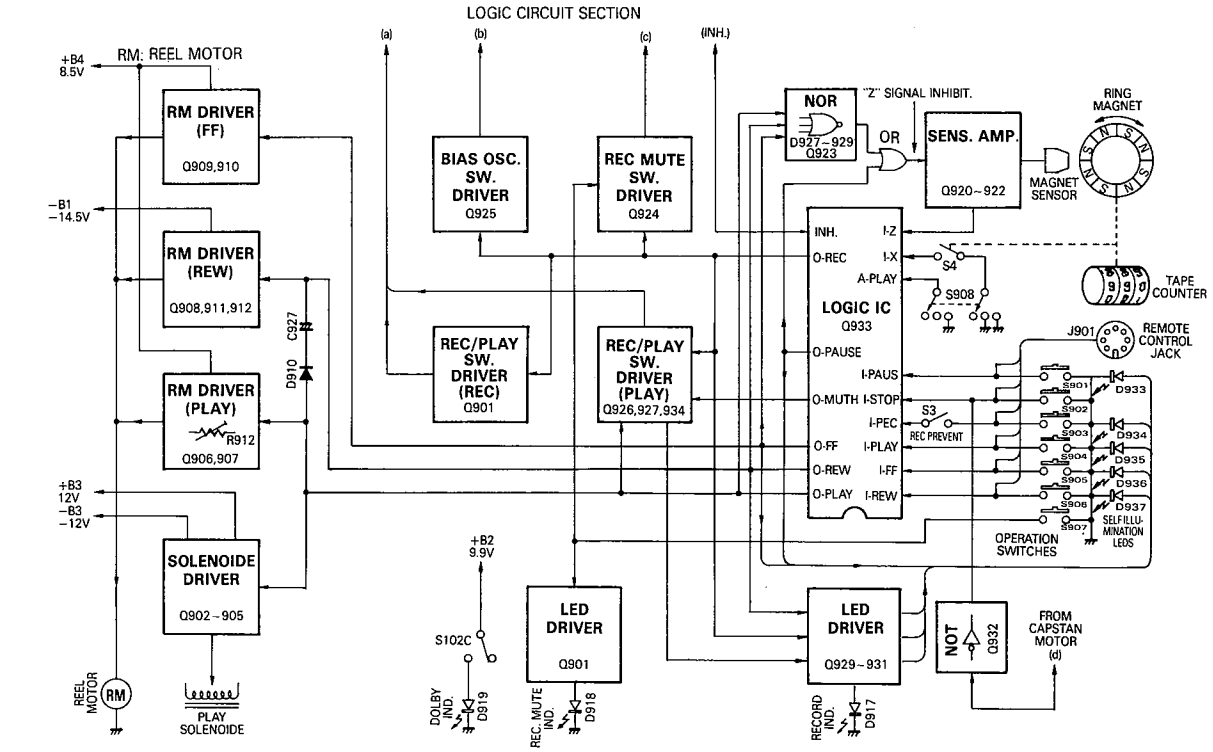


Figure 1

CIRCUIT DESCRIPTION

LOGIC CIRCUIT

ND-990 logic circuit consists of one unit of the logic IC and several pieces of transistors. Brief explanation on the operations of this circuit is given below. As for the basic of the logic IC, refer to the description in SEMICONDUCTOR DATA given at the end of this manual. The explanation given below refers to the point for each operation mode. Symbols such as *1 and *2 marked in the circuit diagram indicate that the special description is made on these sections.

A. STOP (POWER ON) MODE (See figure 2)

The diagram shows the operation when the cassette tape is inserted into the tape deck and the power source is turned on.

*1 .... The switch S2 is turned OFF when the cassette tape is not inserted into the tape deck, or when the cassette lid is open despite the cassette tape being inserted thereto. At this time, Q932 is turned on, and the logic IC is fixed at the "STOP" mode. This switch also functions as a switch for the CAPSTAN MOTOR.

*2 .... The switch S3 is turned OFF when the cassette tape is not provided with the Erasure Prevention Tab. At this time, the logic IC cannot enter into the "RECORDING" mode, i.e., the tape cannot be erased.

*3 .... The switch S4 is incorporating the tape counter. It is turned on when the indication on the tape counter is between "900" and "999", and otherwise, it is turned off.

*4 .... The ring-shaped magnet is fixed to the tape counter. It rotates only when the tape counter is operated (i.e. when the tape runs).

*5 .... The capacitor initializing the logic IC to the "STOP" mode when the power source of the tape deck is turned on. Since turning of the "STOP" input terminal of the IC into the "H" delays (compared with other input terminals) due to charging of this C936, the IC changes to the "STOP" mode.

*6 .... R944 and C937 determine the oscillation frequency for clock-pulse oscillator incorporating the logic IC. The operation timing of the logic IC is determined by this clock-pulse. Therefore, do not modify this time constant of the circuit.

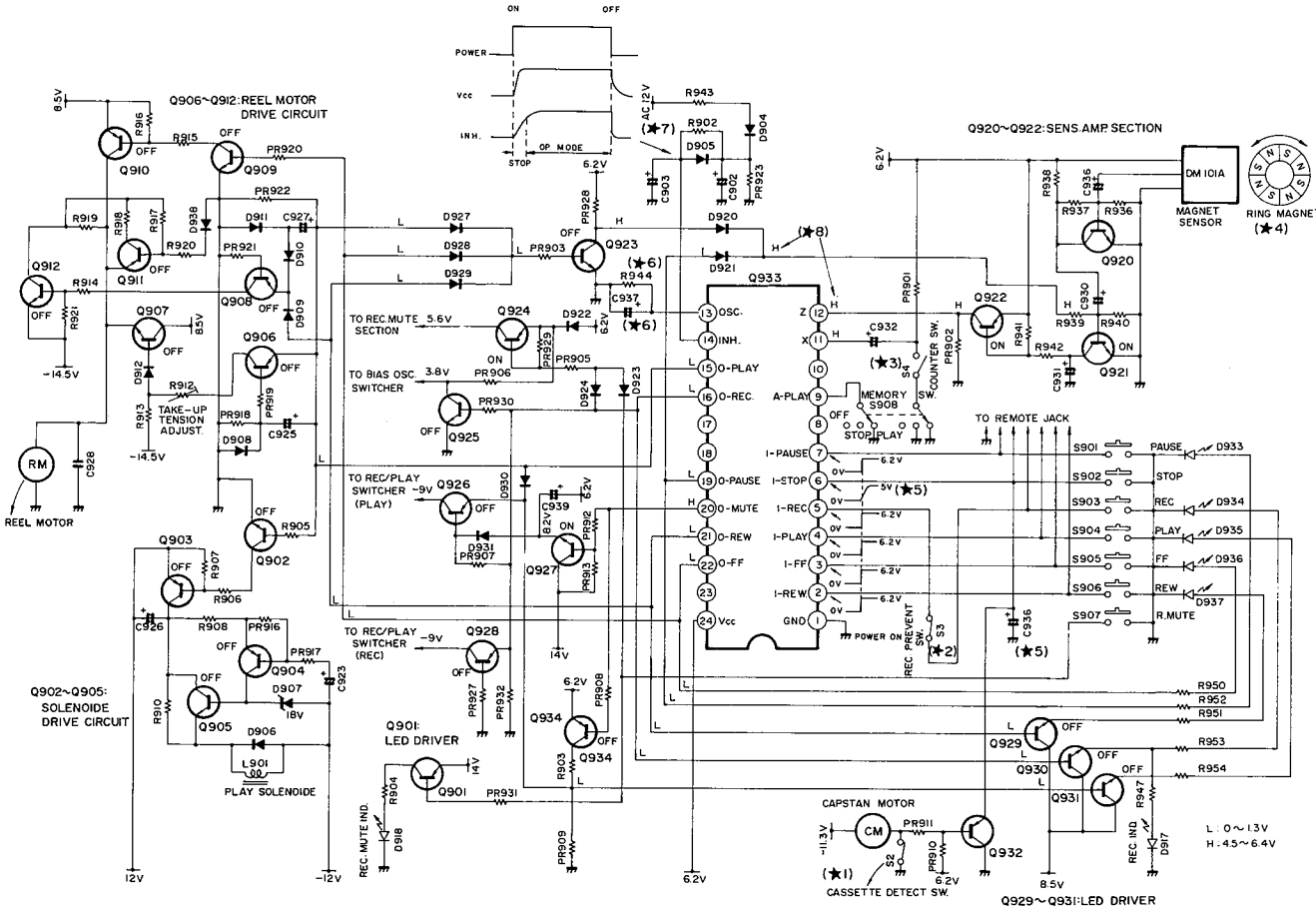


FIGURE 2 STOP (POWER ON) MODE

*7 .... "INH" signal keeps the output of the logic IC in the state of "STOP" for a few seconds after POWER-ON. However, although the input signal of the logic IC is received during this period, its input signal (instructions) is executed only after "INH" signal is turned to "H", in order to keep the tape deck in the unoperational status during the period of warm-up of the amplifier section of the tape deck and other stereo equipments.

*8 .... When the logic IC is in the modes of "STOP" or "PAUSE", this line is turned to "H". At this time, output of the sens. AMP. section is fixed to the "H". (Auto-stop is prohibited).

B. PLAY (PAUSE) MODE (See figure 3)

The diagram shows the operation in the "PLAY" mode. Waveforms in the dotted line and the symbol of "H", "L", "ON" and "OFF" shown in ( ) in the diagram indicate the operation performing the "PAUSE" during the period of "PLAY" mode.

*1 .... The transistors Q904 and Q905 remain in the status of ON until the capacitor C923 is charged up, then they are turned off. During this period, the solenoid receives the constant voltage drive (about 18V). This operation is performed when "STOP" is changed to "PLAY", or when PAUSE is released from "PLAY/REC PAUSE".

*2 .... The reel motor rotates normally after its instantly reverse rotation (REW.), when "STOP" is changed to "PLAY", or when PAUSE is released from "PLAY PAUSE". This operation is performed in order to prevent the tape from slackening. The PLAY signal from the logic IC flows to Q908 through D901 until C927 is charged. Thus, Q911 and Q912 are turned on during that period, then the reel motor rotates reversely. Timing from the reverse to normal rotation is determined by the C927 and C925.

*3 .... The ring magnet keeps rotating while the tape runs in the "PLAY" mode. The signal from the magnet sensor becomes the signal turning the Q921 ON and OFF, after it is amplified by Q920. Since Q921 repeats on and off, C931 repeats charging and discharging. Thus, the charged current flows in R941, and Q922 is turned on, then the Z input of the logic IC is turned to "H". When the Z input is turned to "L", the logic IC is automatically switched to the "STOP" mode.

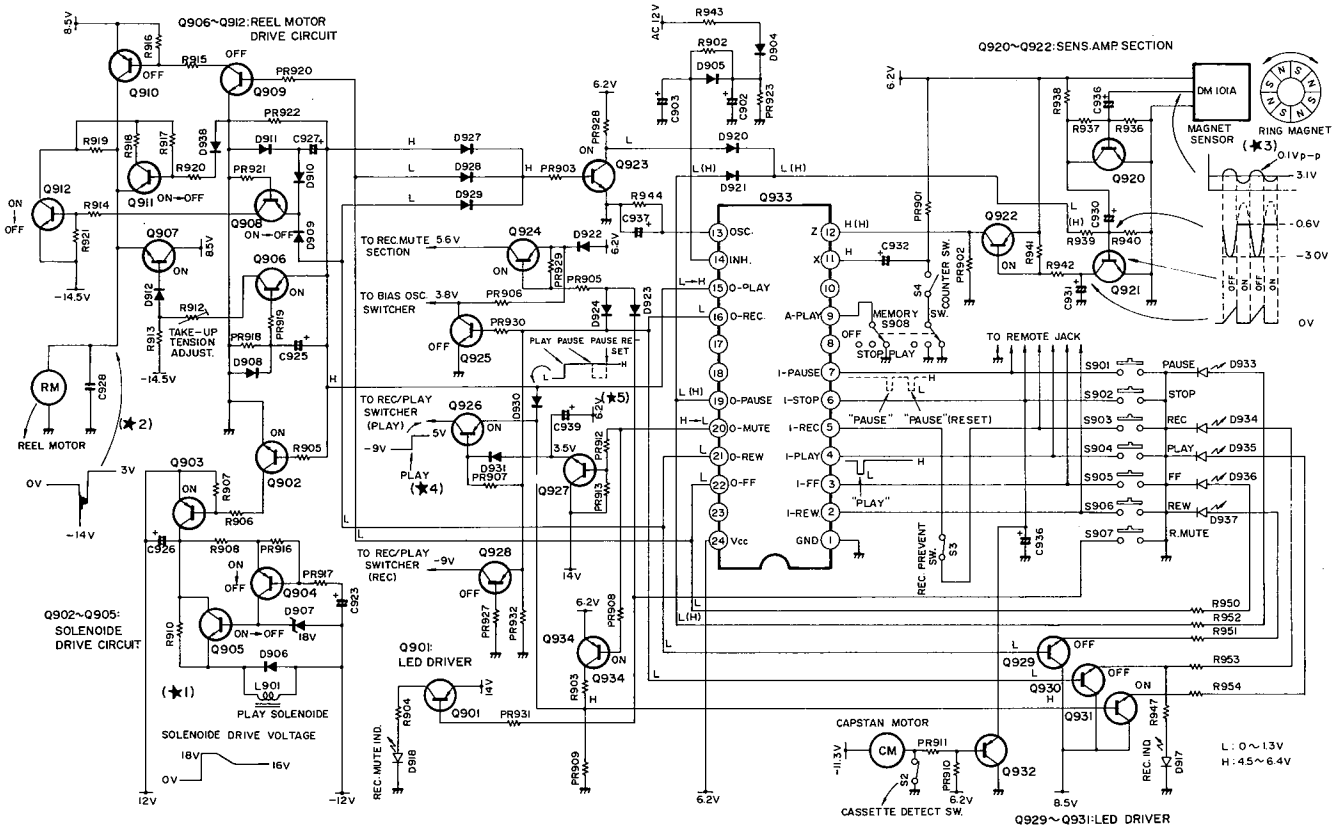


FIGURE 3 PLAY (PAUSE) MODE

*4 . . . . When the logic IC is in the "PLAY" mode, Q926 is turned on. Then, it drives the "PLAY" switch (transistor switch) of the amplifier section to ON. Q926 remains in the status of ON (not turned OFF), even if the PAUSE operation is performed during the period of "PLAY".

*5 . . . . The "PLAY" signal from the logic IC is "H" during the operation of "PLAY" and "L" during the operation of "PAUSE".

C. RECORDING (REC. MUTE) MODE (See figure 4)

The diagram shows the operation in the "RECORDING" mode. Waveforms shown in the dotted line and the symbols shown in ( ) in the diagram indicate the operations when the "REC MUTE" is performed during the period of "RECORDING" mode.

As the operations of REEL MOTOR DRIVE CIRCUIT, SOLENOID DRIVE CIRCUIT and SENS. AMP. SECTION is same as those in the "PLAY" mode, the symbols such as "H", "L", "ON" and "OFF" are not shown.

*1 . . . . The RECORDING mode is attained by pressing the pushbuttons of "REC" and "PLAY" at the same time. By pressing pushbuttons of "REC" and "PLAY" at the same time during the period of "PLAY" mode, "PLAY" mode can be simultaneously changed to the "RECORDING" mode.

*2 . . . . "REC MUTE" does not directly relate to the operation of the logic IC. "REC MUTE" operation is performed by pressing the REC MUTE button during the "RECORDING" mode to turn on Q901 and Q924 being in the status of off.

D. FF (REW) MODE (See figure 5)

The diagram shows the operation in the "FF" mode. Waveforms shown in the dotted line and the symbols shown in ( ) in the diagram indicate the operations in the "REW" mode.

*1 . . . . In the "FF" mode, Q909 and Q910 are turned ON, and in the "REW" mode, Q908, Q911 and Q912 are turned ON.

*2 . . . . In the "REW" mode,when the tape counter indicates "999", S4 is turned ON and the X input terminal of the logic IC turns to "L" as shown in the diagram. (However, no change occurs when the S908 is in the OFF position). When this signal comes in, IC performs the different operations depending on "H" or "L" of the A-PLAY terminal.

A-PLAY "H"- - - "STOP"

A-PLAY "L"- - - "STOP" "PLAY"

The X input accepts the counter switch signal only when the deck is in the "REW" mode.

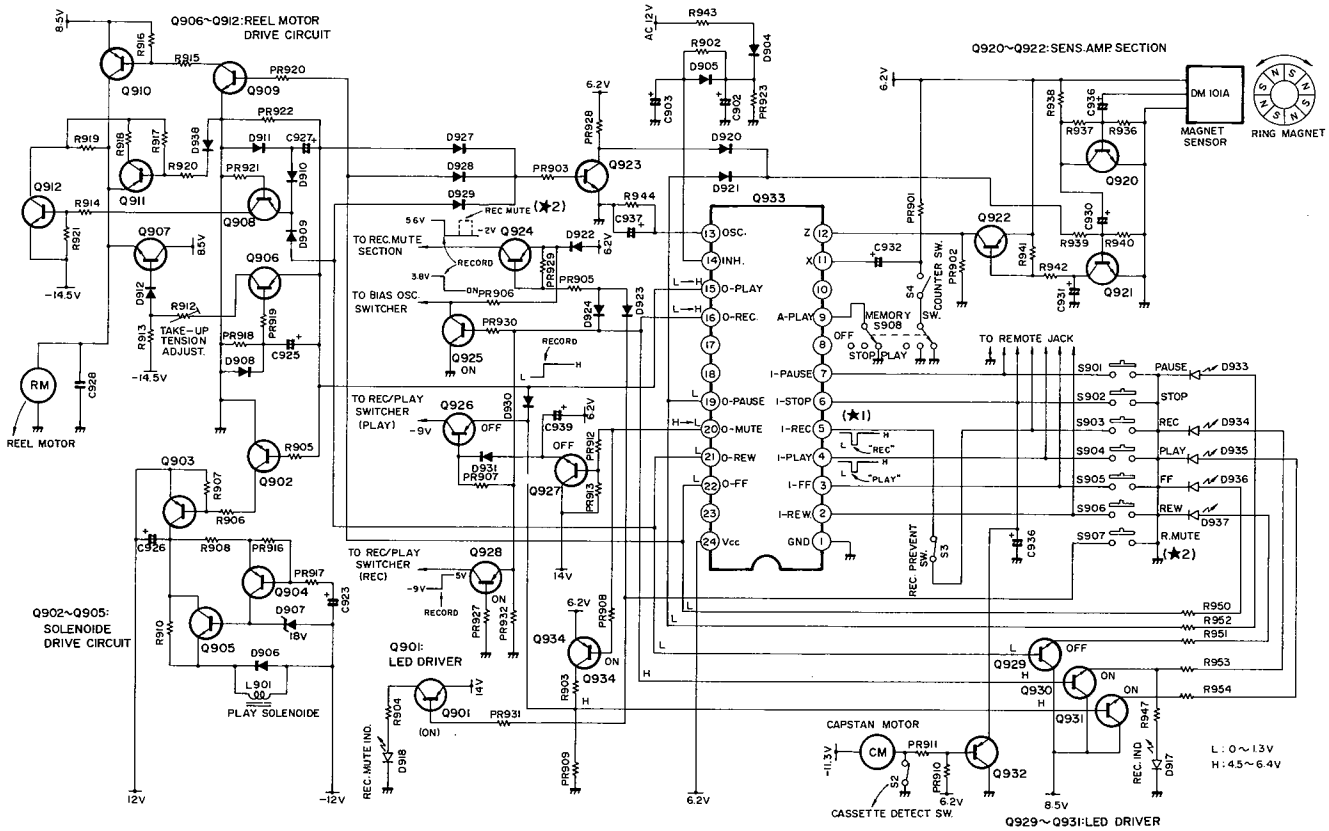


FIGURE 4 RECORDING (REC. MUTE) MODE

*3 . . . . The operation of SENS. AMP SECTION is same as that in the "PLAY" mode. However, on account of the fast rotation of the ring magnet, the signal frequency from the magnet sensor becomes high. When the rotation of ring magnet stops at the end of tape reel, Q921 is turned OFF. C931 is charged only, as it is not discharged by Q921. In parallel with the completion of charging C931, the amount of current flowing in the R941 becomes small and Q922 is turned OFF soon. The Z input terminal of the IC turns to "L". For this reason, the IC is put in the "STOP" mode. These operations are performed in the modes of "FF", "REW" and "PLAY".
C931, R941 and R942 are of large time constant sufficient to avoid the error operation in the "PLAY" mode having the low frequency between ON and OFF.

ELECTRONIC SWITCH CIRCUIT

Generally, in the two head-type cassette deck, the relay or the slide switch interlocking with mechanism is used for switching the circuit between recording and playback. In stead of these switches, ND-990 adopts the electronic switch by the transistor and FET. This could help avoiding the trouble owing to the bad connection of the switch contact and reducing the clicknoise at the time of switching.

A. HEAD SWITCHING CIRCUIT (See figure 6)

This is the circuit connecting the one unit of REC/PLAY HEAD to PLAY EQUALIZER in the "PLAY" mode and to REC EQUALIZER in the "REC" mode.

* "PLAY" MODE:

Q1, being no bias (zero bias), is ON.
Q2, at whose gate the negative voltage is applied, is cut-off. Thus, the Head is connected to the PLAY EQUALIZER. (This status is kept in the mode other than "REC" mode.)

* "REC" MODE:

In the "REC" mode, the bias oscillator operates to generate the RECORDING BIAS current. This current flows to the gates of Q1 and Q2 through VR, C1 and C2. Thus, the bias current is rectified at the D1 through D4 connected to Q1 and Q2. The bias current voltage rectified applies the negative voltage to the gate of Q1 and also functions to cancel the negative voltage applied to the gate of Q2. For this reason, Q1 is cut-off. Q2 is turned ON. Thus, the Head is connected to the REC EQUALIZER. Q3, being turned ON in the "REC" mode, short-circuits the PLAY EQUALIZER input with the earth.

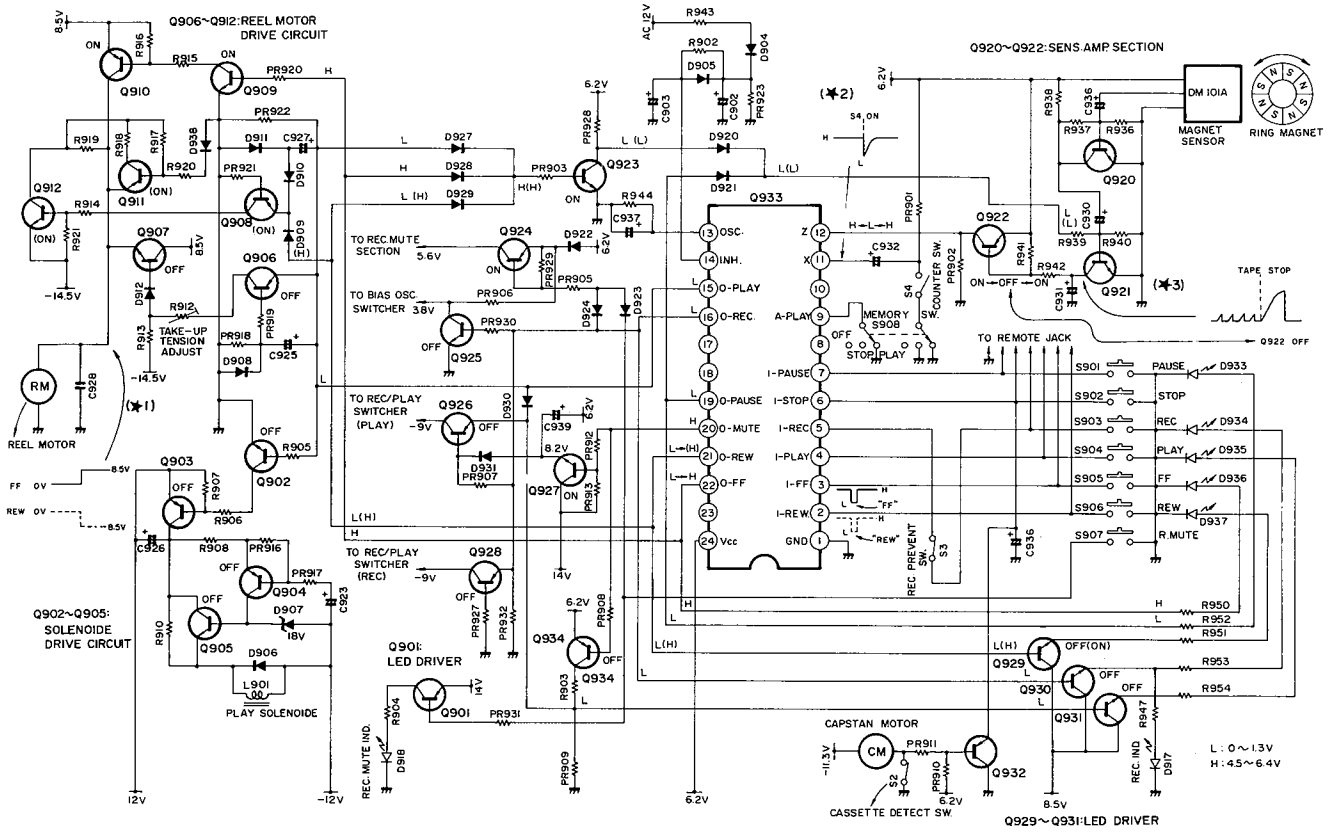


FIGURE 5 FF (REW) MODE

B. DOLBY INPUT SWITCHING CIRCUIT
(See figure 7)

This is the circuit switching the playback signal from the PLAY EQUALIZER and recording signal from the Mic Amp or line input terminal.

As shown in the diagram, 2 pieces of FET is also used in this circuit. In the mode other than "PLAY" and "REC" modes, the negative voltage is applied to the gates of Q1 and Q2 through D5, R3 and R4, and both Q1 and Q2 are cut-off.

In the "PLAY" mode, the positive voltage (about 5V) is applied to the switching signal line "PLAY" from the logic circuit. Thus, Q1 is connected to the Dolby Processors. At this time, the switching signal line "REC" is the negative voltage (about −9V) without change. Reversely in the "REC" mode, Q2 is turned ON and Q1 is turned OFF. The switching signal line sends the "REC" and "PLAY" signals, in addition to this Dolby input switching circuit, to the encode and decode switching circuit of the Dolby Processor.

As shown in the circuit diagram in 12 page, FET gates for these switches are connected in parallel. The operation of encode and decode switching of the Dolby Processor is same as that mentioned above. Therefore, its explanation is omitted. The FET connected to the output terminal of the DIN jack functions as DIN output muting. In the modes other than "PLAY" mode, these FETs are turned OFF. This is the circuit to avoid oscillation of the tape deck owing to the stray capacity of DIN code during the recording.

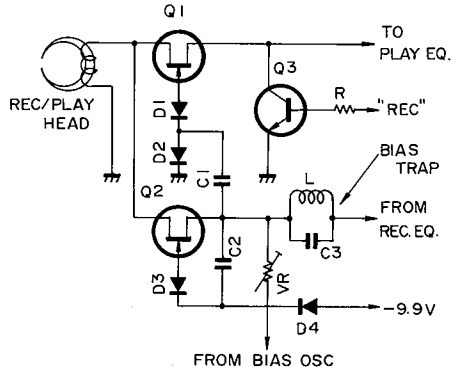


Figure 6

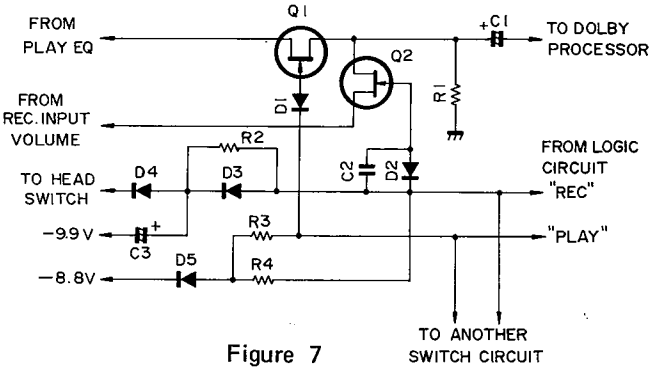


Figure 7

C. REC MUTE SECTION (See figure 8)

REC MUTE is performed by using 2 pieces of transistor per each channel. In the mode other than "REC" mode, the positive voltage (about 5 to 6V) is applied to the REC MUTE switching line from the logic circuit.

As Q1 is turned OFF for this reason, the gain of the recording Amp (within the Dolby IC) becomes very small, being determined by the R1 and R2.

As Q2 is turned ON, output of the recording Amp is short-circuited with the earth. In the "REC" mode, supply of the positive voltage from the logic circuit is stopped. Thus, the negative voltage is applied to the base of Q1 and Q2 through R9, R6, R10 and R8. Q1 is turned ON, and the value of the impedance between the NFB input terminal (pin 15) of the recording Amp and earth is in parallel with one of R2, R3 and elements for equalizer. The value of NFB resistance is in parallel with one of R1 and R4. For this, the recording Amp starts functioning with the necessary gain. On the other hand, Q2 is turned off, and the output of recording Amp is fed to the R/P head. In this status, by pressing the REC MUTE button, Q1 and Q2 return to their original status until the button is released. Thus, no recording section is formed in the tape. As so quick turning on (off) of Q1 and Q2 generates the noise, the appropriate time constant is given at C4 and C5. Usage of 2 pieces of transistor is aimed at compensating for the insufficient attenuation of the signal observed in case of the single transistor.

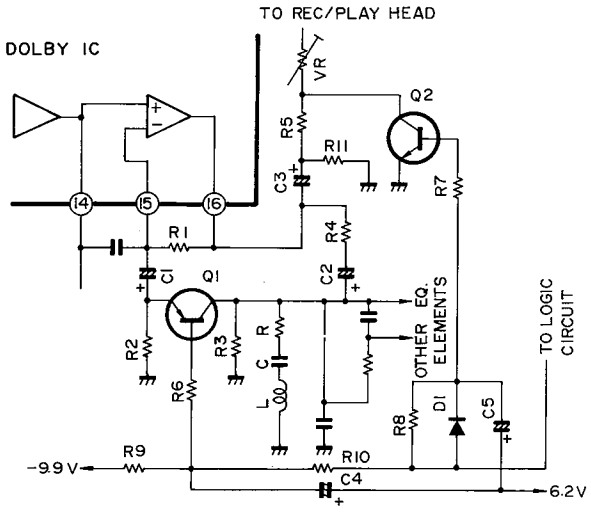


Figure 8

ALIGNMENT

TEST EQUIPMENT

Allow a minimum of 10 minutes warm-up for test equipment.

Maintain rated line voltage.

- Audio Signal Generator
- Vacuum Tube Voltmeter (VTVM)
- Frequency Counter
- Resistance Attenuator (ATT)
- Torque Meter (Cassette tape type)
- Screwdriver

Test Tapes

- MTT–111 (3000 Hz)
- MTT–114 (10 kHz)
- MTT–150 (400 Hz)
- AC–512 (TDK SA-X C-90 or equivalent)

ADJUSTMENT PROCEDURE

Adjustment Items	Spec. Value	Test Tape	Deck Mode	Volume			Switch		Adjustment Parts	Test Points	Input (ATT)	Hook-up	Remarks
				INPUT	OUTPUT	BIAS	TAPE	NR					
Take-up Torque Adjustment	50±5g-cm	Torque Meter	Play	–	–	–	–	–	R912	Torque Meter	–	–	Torque Meter indicates 50±5g-cm.
Tape Speed	3000±30Hz	MTT–111	Play	–	Max.	–	LH	OUT	Semi-fixed Resistor (Figure 10)	Line Output	–	Figure 11	Frequency Counter indicates 3000±30Hz.
Head Azimuth Confirmation	Maximum	MTT–114	Play	–	Max.	–	LH	OUT	Adjusting Screw (Figure 12)	Line Output	–	Figure 13	Maximum output level on VTVM. After adjusting, apply a locking paint to the adjusting screw.
Playback Sensitivity	100±5mV	MTT–150	Play	–	Max.	–	LH	OUT	R401 (L) R402 (R)	TP 1 TP 2	–	Figure 14	VTVM indicates 100±5mV.
Line Input	100±5mV	AC–512	Record Pause	Adjust	Max.	–	–	OUT	–	TP 1 TP 2	400 Hz –20 dB	Figure 15	VTVM indicates 100±5mV. After adjusting, do not change the INPUT volume.
Level Meter	Meter Ind: +3 dB	AC–512	Record Pause	Adjust	Max.	–	–	OUT	R419 (L) R420 (R)	Level Meter	400 Hz –20 dB	–	Level Meter indicates +3 dB (Dolby level).
	Meter Ind: 0 dB	AC–512	Record Pause	Adjust	Max.	–	–	OUT	R419 (L) R420 (R)	Level Meter	400 Hz –23 dB	–	Level Meter indicates 0 dB.
REC/PLAY Frequency Characteristics	0^{+0}_{-2} dB	AC–512	Record & Play	Adjust	Max.	"0" Position	CrO_2	OUT	R417 (L) R418 (R)	Line Output	400Hz/ 10 kHz –43 dB	Figure 16	Difference between 400Hz and 10kHz output is kept within 0 dB (+0, –2 dB) on VTVM.
REC/PLAY Sensitivity	Monitor Output	AC–512	Record & Play	Adjust	Max.	"0" Position	CrO_2	OUT	R405 (L) R406 (R)	Line Output	400 Hz –23 dB	Figure 16	VTVM indicates 450 mV (Reference value).

* Test conditions: Input: 0 dB (1 Vrms)
Line input impedance: 600 ohms
Line output load impedance: 50 kohms (47 kohms)
Test point load impedance: non-load

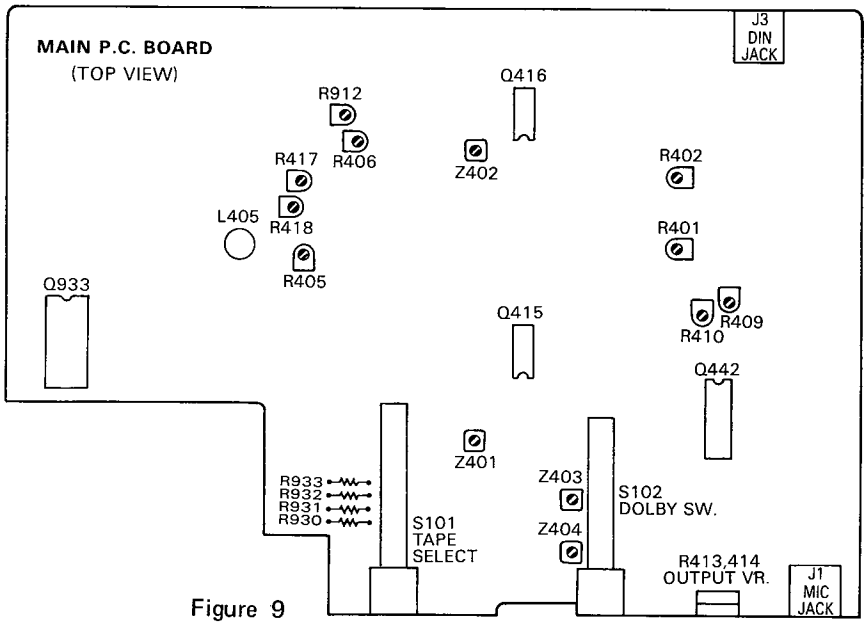


Figure 9

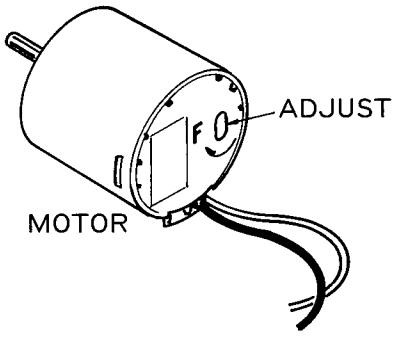


Figure 10

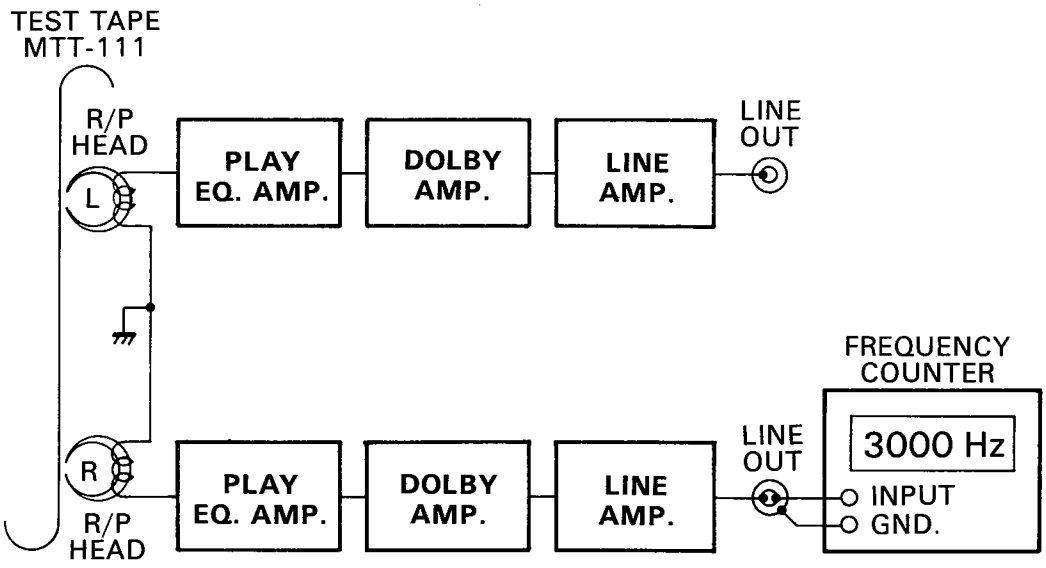


Figure 11

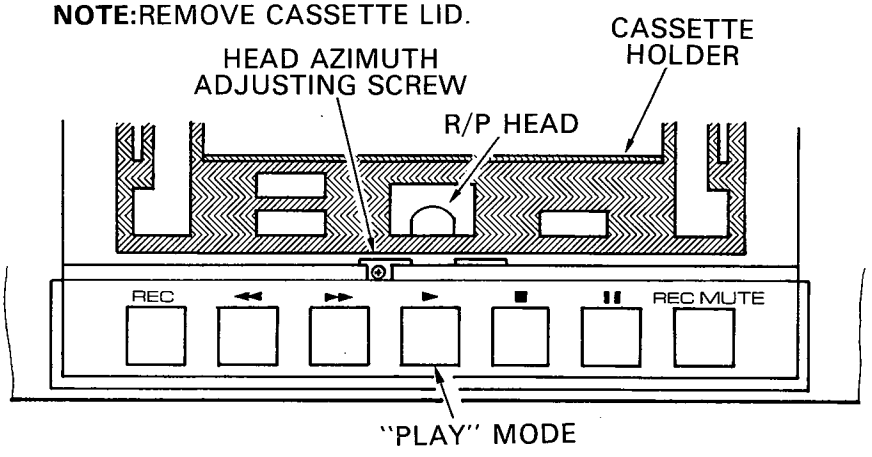


Figure 12

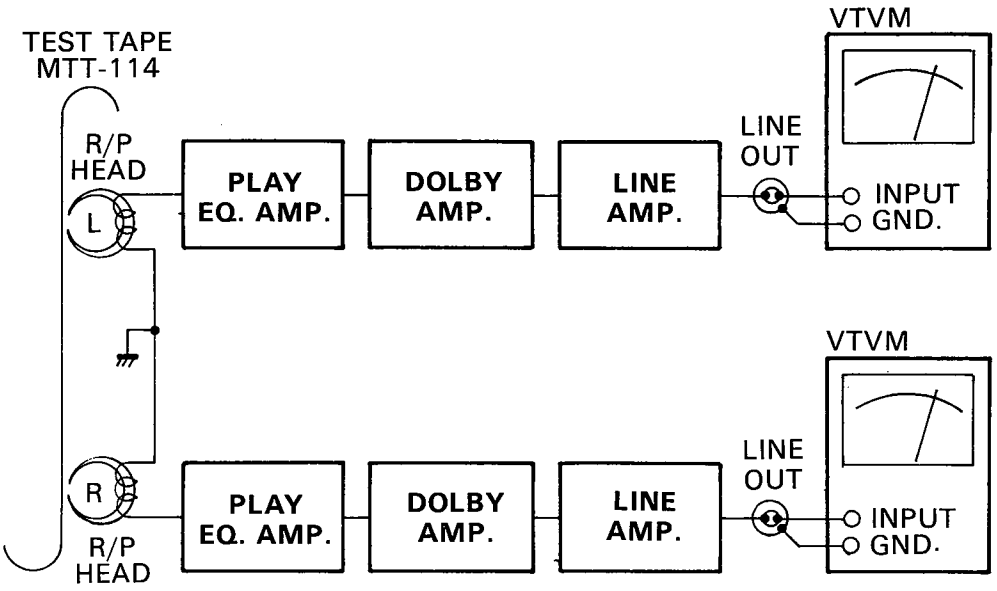


Figure 13

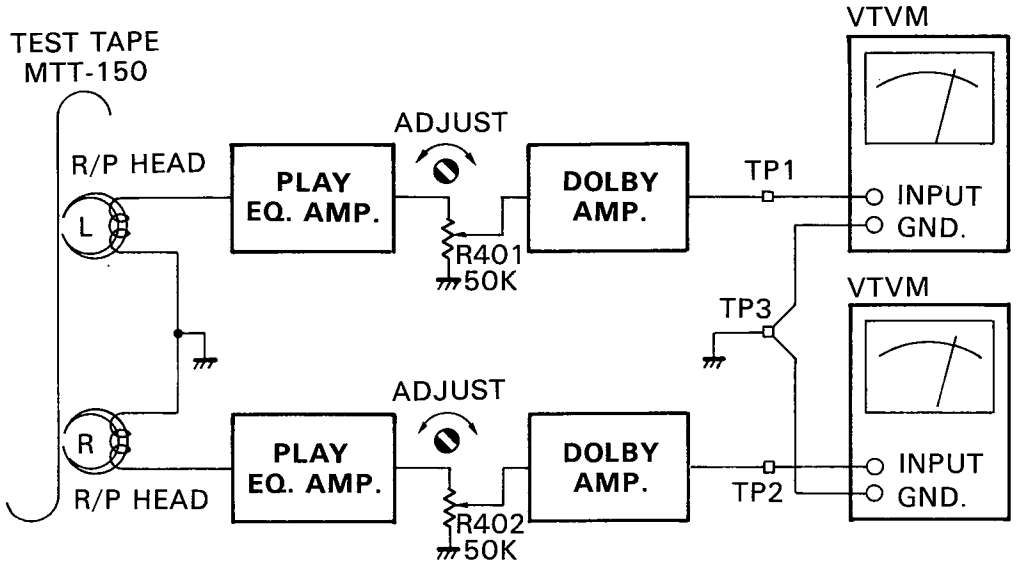
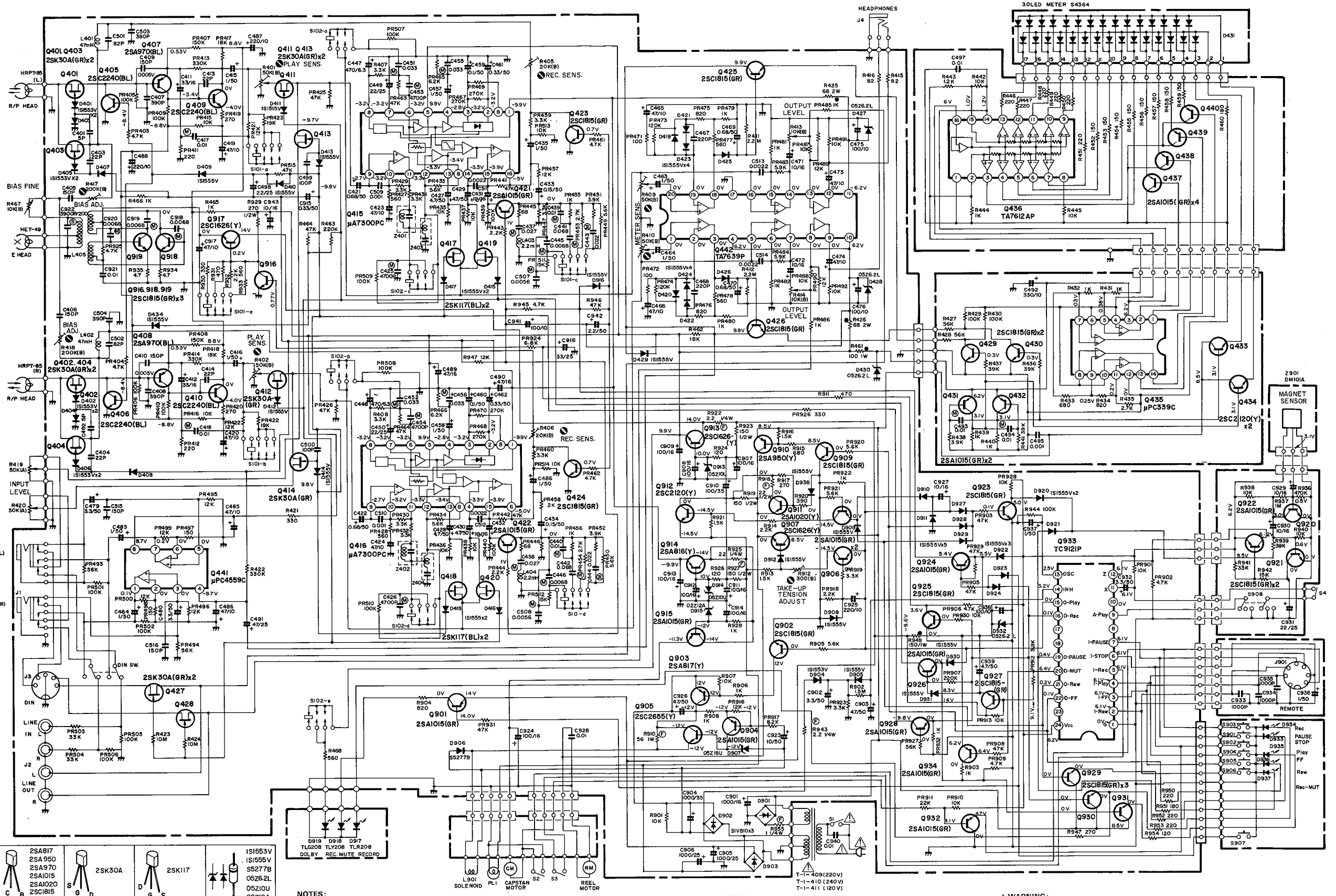


Figure 14

SCHEMATIC DIAGRAM



NOTES:

1. SCHEMATIC IS SUBJECT TO CHANGE WITHOUT NOTICE.

UNLESS OTHERWISE SPECIFIED:

2. RESISTANCE VALUES ARE IN OHMS.
   K = 1,000; M = 1,000,000
3. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN pF OR µF (P = pF, M = µF), LESS THAN 1.0 ARE IN µF. (ELECTROLYTIC CAPACITANCE VALUES ARE IN µF/WV.)
4. VOLTAGES ARE MEASURED TO CHASSIS GROUND WITH NO SIGNAL APPLIED USING A "DC VOLTMETER".

★SCHEMATIC SYMBOLS:

Ⓜ POLYESTER FILM CAPACITOR
Ⓢ POLYSTYRENE FILM CAPACITOR
Ⓕ FUSIBLE RESISTOR

● NONFLAMMABLE RESISTOR
PR△○□ PRINTED RESISTOR (PRC)

★SWITCHES:

S1	POWER SW.	OFF	ON	S101a ~ e	TAPE SELECT	LH	FeCr METAL CrO₂
S2	CASSETTE DETECT	OFF	ON	S102a ~ e	DOLBY NR	OUT	IN IN(MPX ON)
S3	ERASE PREVENT	OFF	ON	S908	MEMORY	OFF	STOP PLAY
S4	COUNTER SW.	OFF	ON				

★WARNING:

⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

Figure 18

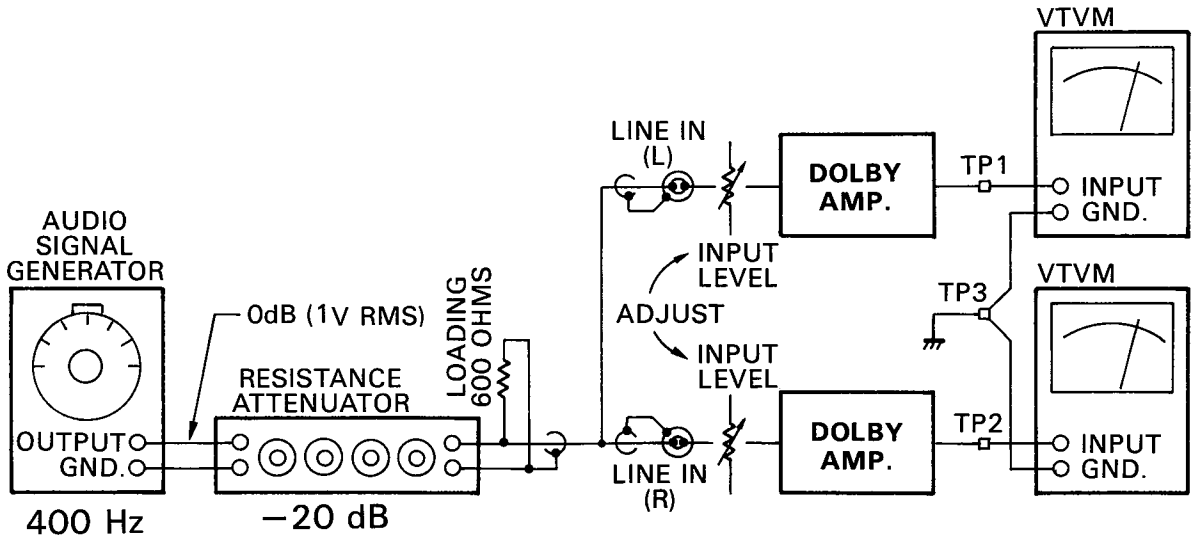


Figure 15

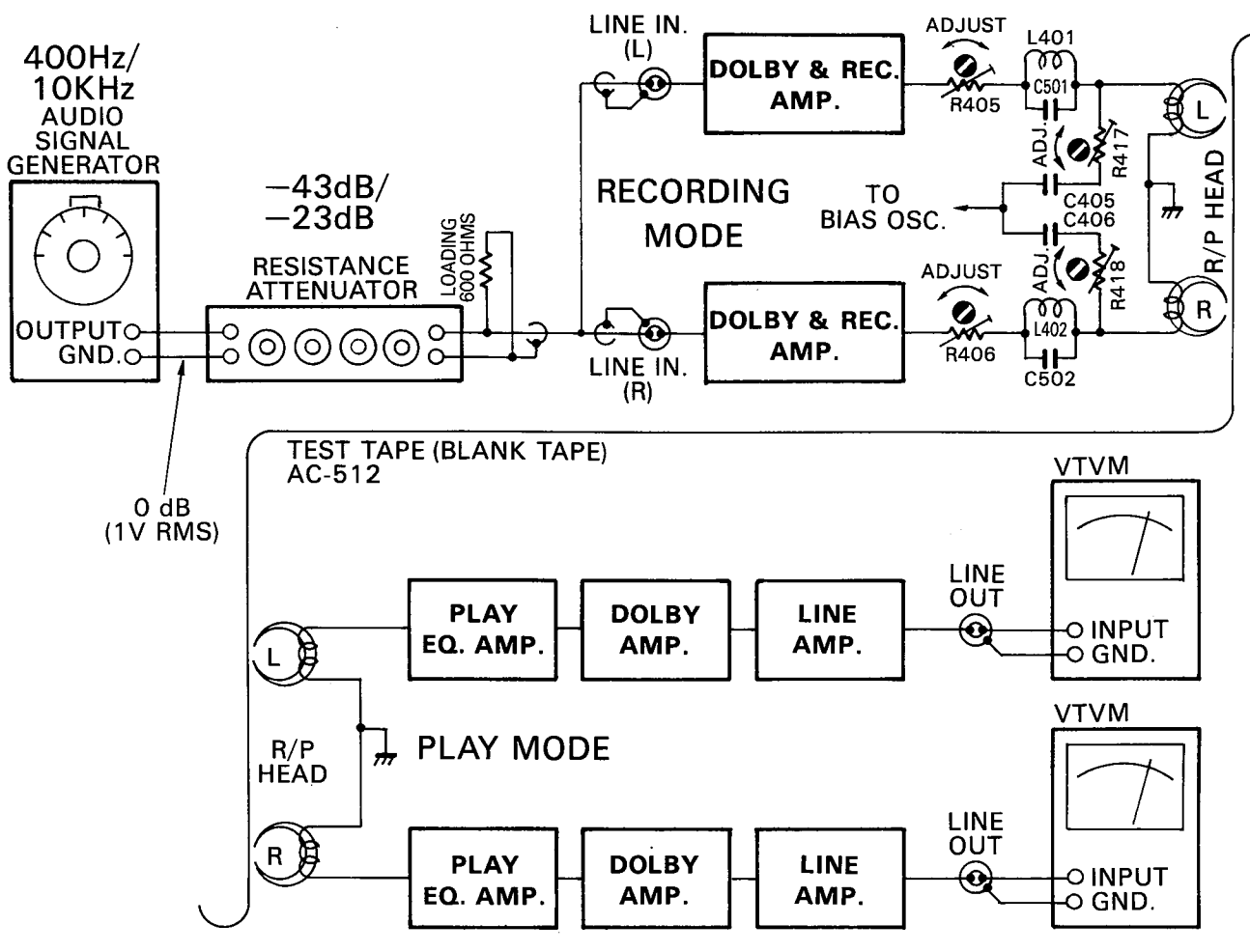


Figure 16

DISASSEMBLY

BOTTOM PLATE (LEFT) REMOVAL

To access to the regulator or the logic control section, remove the bottom plate as shown below.

Note: The tape transport mechanism will remain on the chassis.
It is not recommended to remove the front panel and this plate at the same time.

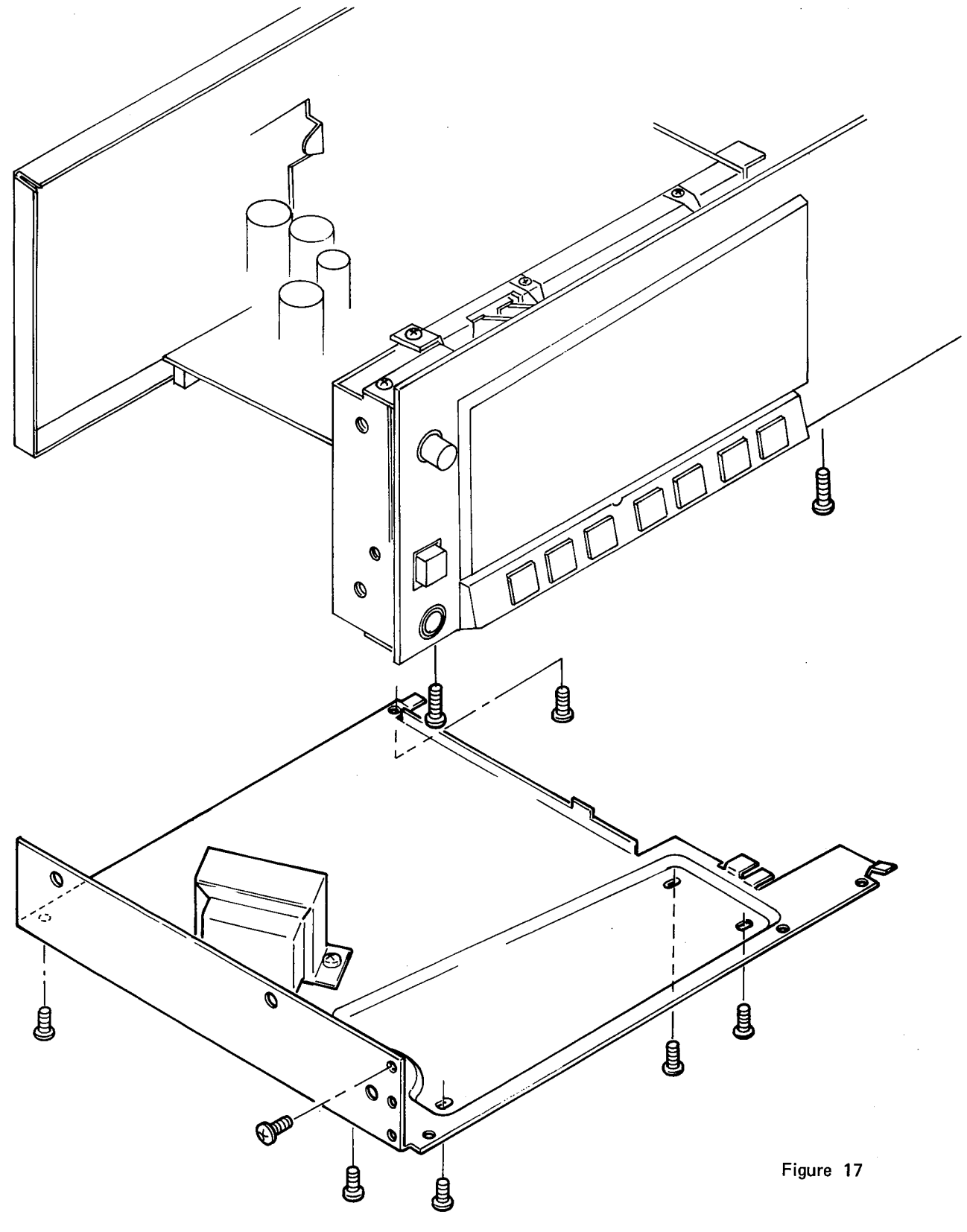
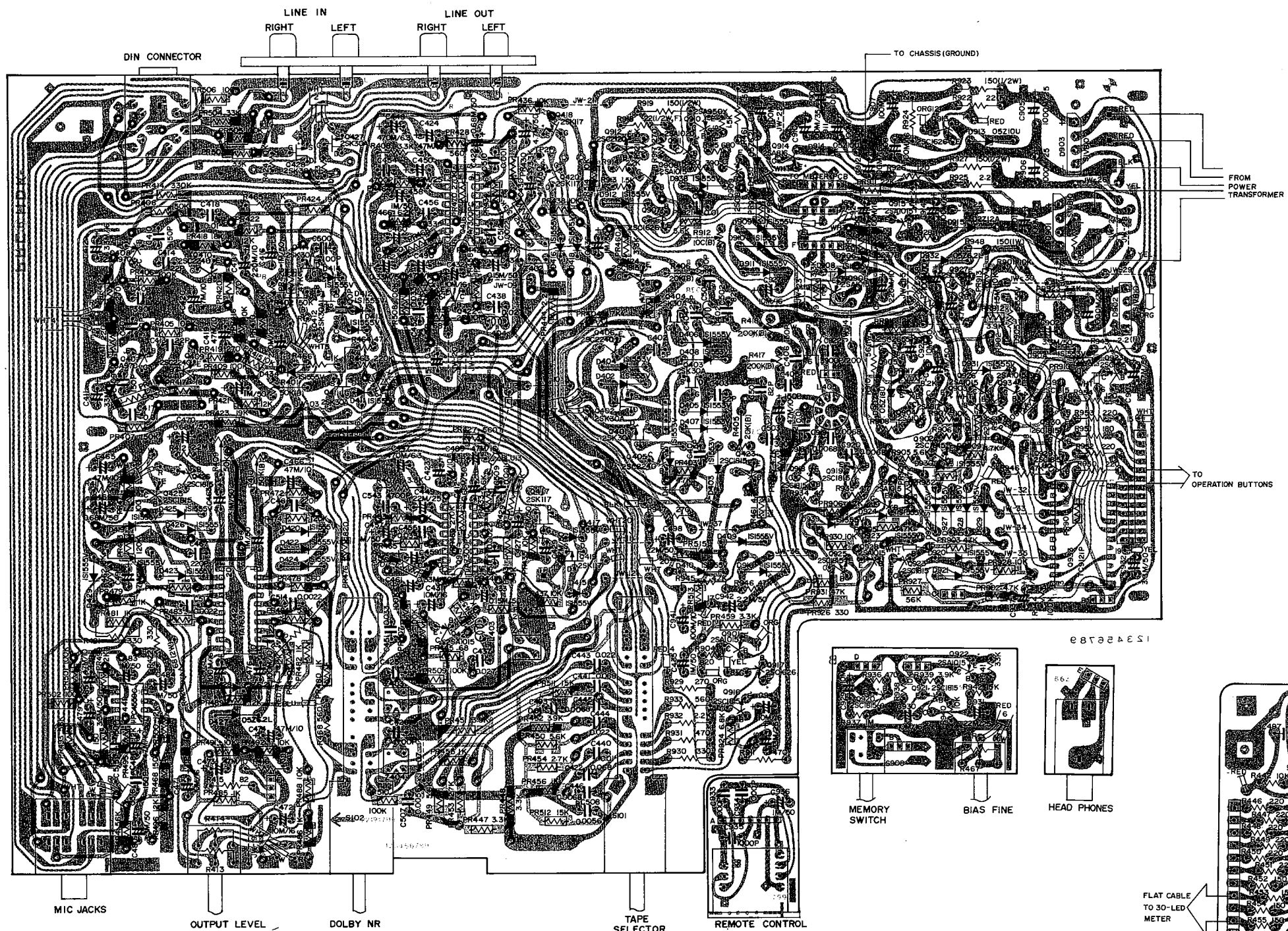
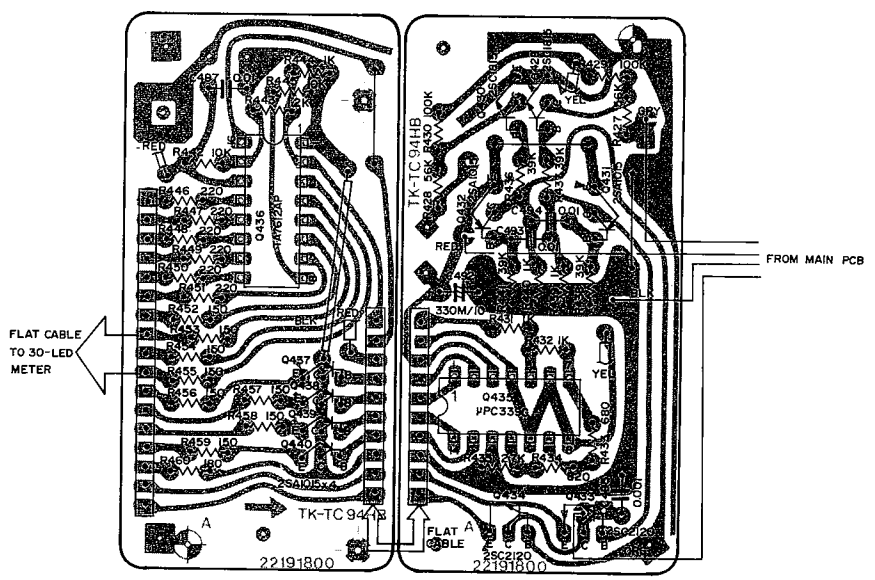


Figure 17

P.C. BOARD



MAIN PCB (PREVIOUS)



METER PCB

NOTE: Red Screen — Printed resistor side

Figure 19

MECHANICAL PARTS LOCATION

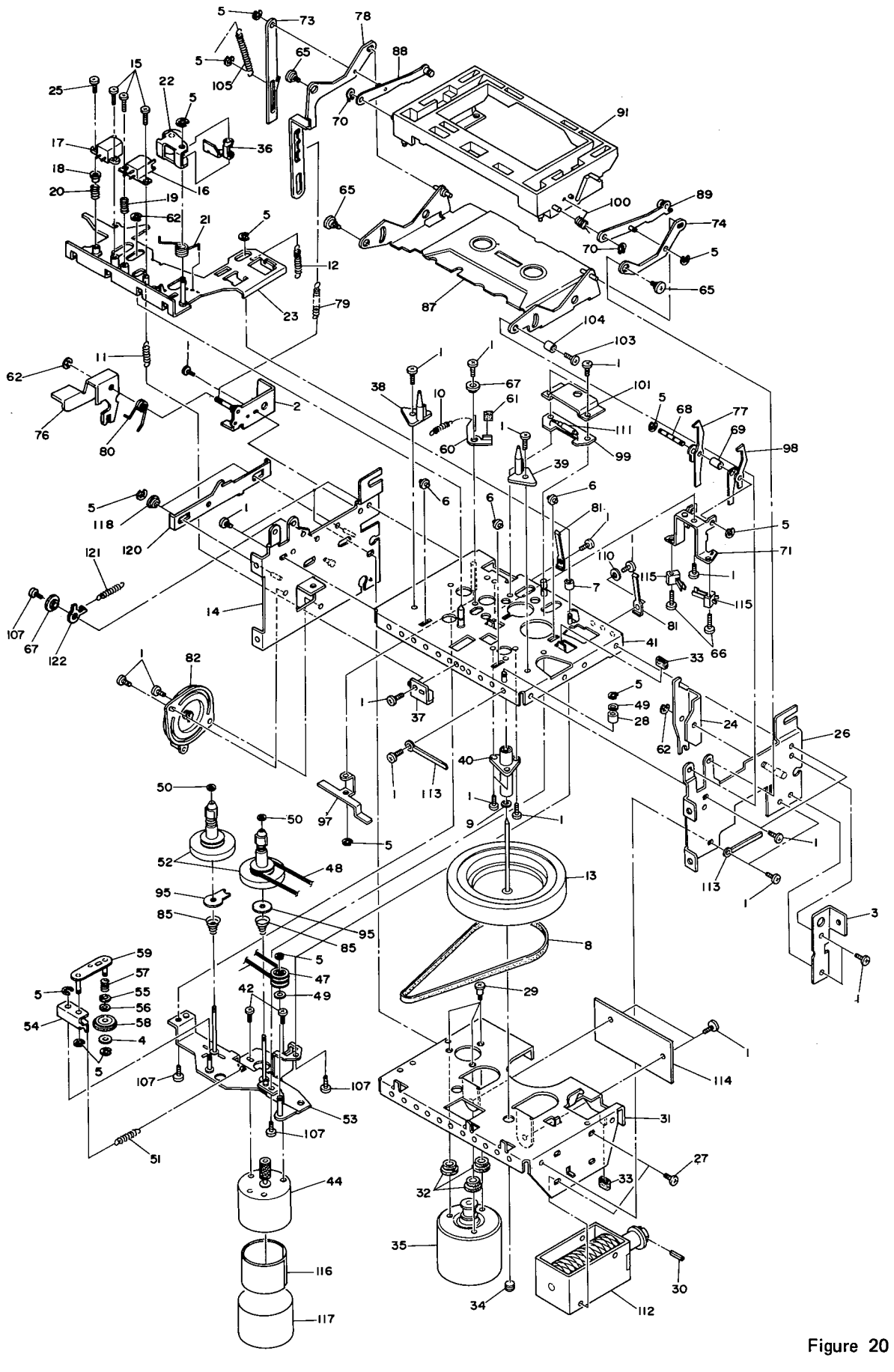


Figure 20

CABINET PARTS LOCATION

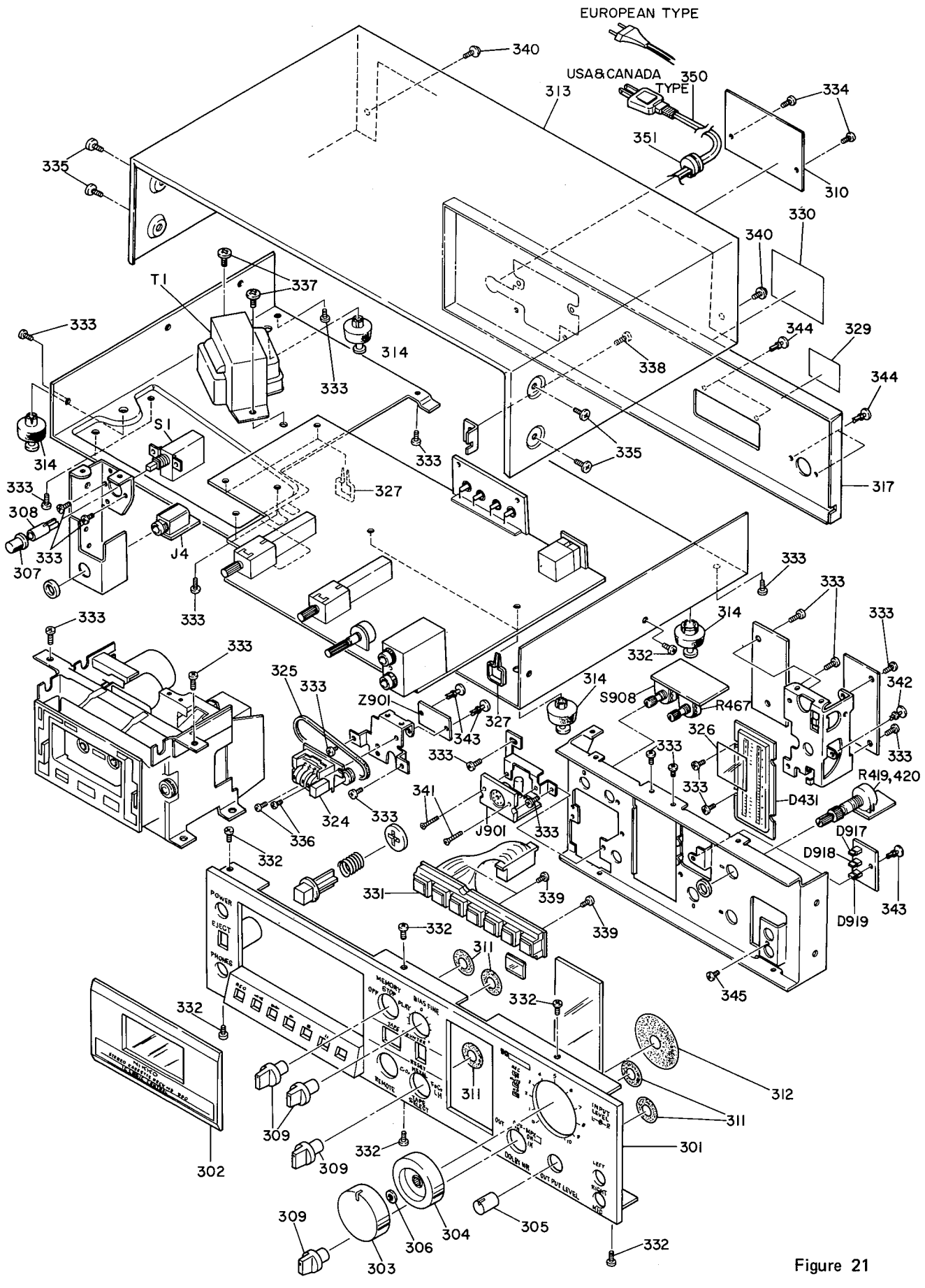


Figure 21

PARTS LIST

NOTES:

1. ★ The KEY NUMBER (#) on parts list relate to number in "MECHANICAL PARTS LOCATION" and "CABINET PARTS LOCATION".
2. + Numberals in file indicate the quantity of parts used in one type.
3. ++ TR : Transistor
   FET : Field effect transistor
   VR : Volume control (Variable resistor)
   RES : Carbon film fixed resistor
   MO-RES : Metal oxide film fixed resistor
   CEM-RES : Cemented wirewound fixed resistor
   FP : Flame proof
   C-CAP : Ceramic capacitor
   E-CAP : Aluminum electrolytic capacitor
   M-CAP : Polyester film capacitor
   S-CAP : Polystyrene film capacitor
   T-CAP : Tantalum electrolytic capacitor
   BP-CAP : Bipolar electrolytic capacitor
   LC-CAP : Low current leakage electrolytic capacitor.
4. Assemblies and parts are subject to change without noitce.
5. Parts ordering procedure:
   A. DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only)
   B. Include any order
      a. Part number.
      b. Part description.
      c. Model number.
   (any of the above lacking from an order may delay shipment of that order.)

CAUTION:

The △ mark, the KEY NO. and the SYMBOL NO. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

PART ORDERING PROCEDURE - - - - - DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

CASSET MECHANISM ASSEMBLY

KEY NO.	SYMBOL NO.	TYPE+ W	E	B	DESCRIPTION++	PART NO.
1		30	30	30	Screw – BFTS 2.6ϕx5	857205S
2		1	1	1	Holder, eject lever	7034040
3		1	1	1	Holder, mechanism – right	7034050
5		13	13	13	E-ring – 2ϕ	7033200
6		3	3	3	Roller	7152530
7		1	1	1	Roller – (H)	7152540
8		1	1	1	Belt, drive	7903420
9		1	1	1	Washer, PO – 2.5ϕ	7002340
10		1	1	1	Spring, brake	7441030
11		1	1	1	Spring, head slider – (A)	7441040
12		1	1	1	Spring, head slider – (B)	7441050
13		1	1	1	Flywheel assembly	7490280
15		3	3	3	Screw – BMS 2ϕx5	850105S
16		1	1	1	Head, record/playback – HRPT-85	1400090
17		1	1	1	Head, erase – HET-49	1400040
18		1	1	1	Sleeve, erase head	7152480
19		1	1	1	Spring, head base	7440630
20		1	1	1	Spring, erase head	7440690
21		1	1	1	Spring, pinch lever	7441060
22		1	1	1	Pinch roller assembly	7903430
25		1	1	1	Screw – BMS 2ϕx6	850106S
27		2	2	2	Screw – BMS 3ϕx5	850305S
28		1	1	1	Roller – (HL)	7152540
29		3	3	3	Screw, motor retaining	7121180
30		1	1	1	Pin, solenoid – (B)	7450200
32		3	3	3	Cushion, motor	7903230
33		2	2	2	Stopper, head chassis	7903440
34		1	1	1	Bearing, thrust	7403360
35		1	1	1	Motor assembly, main	9200020
36		1	1	1	Holder, pinch lever	7034070
37		1	1	1	Holder, spring	7034080
38		1	1	1	Guide, left	7403370
39		1	1	1	Guide, right	7403380
40		1	1	1	Bearing assembly, flywheel	7490260
42		2	2	2	Screw – BMS 2.6ϕx3	850203S
44		1	1	1	Motor assembly, reel drive	9200030
47		1	1	1	Pulley, center	7403390
48		1	1	1	Belt, counter	7903450
49		2	2	2	Washer, PO – 3ϕ	7002620
50		2	2	2	Washer, PO – 1.7ϕ	7002360
51		1	1	1	Spring – (A)	7441070
52		2	2	2	Reel base assembly	7403400
54		1	1	1	Plate, idler – (A)	7034090
55		1	1	1	Catcher, spring	7050600
56		1	1	1	Felt, FF	7903460
57		1	1	1	Spring, FF idler	7441080
58		1	1	1	Idler assembly, FF	7403410
59		1	1	1	Plate, idler – (B)	7034100
60		1	1	1	Lever, back tension	7034110
61		1	1	1	Felt, friction	7903470
62		3	3	3	E-ring – 3ϕ	7033210
65		3	3	3	Stud screw – 2.6ϕ	7121190
66		2	2	2	Screw – BMS 2.6ϕx10	850210S
67		1	1	1	Bush	7403420
68		1	1	1	Shaft, detection lever	7121390
69		1	1	1	Spacer, lever	7152560
70		2	2	2	G-ring – 2.5ϕ	7033170
71		1	1	1	Holder, detection lever	7034120
73		1	1	1	Slider, lock	7034130
74		1	1	1	Lever, eject – R	7034140
76		1	1	1	Lever, operation – eject	7034150
77		1	1	1	Lever, detection	7034160
78		1	1	1	Lever, eject – L	7034170
79		1	1	1	Spring, eject	7441090
80		1	1	1	Spring, operation plate – eject	7441100
81		2	2	2	Spring, cassette holder	7450130
82		1	1	1	Damper assembly	957004P
85		2	2	2	Spring, back tension	7441110
87		1	1	1	Cover assembly, mechanism	7821140
88		1	1	1	Lever, eject – (A)	7034180
89		1	1	1	Lever, eject – (B)	7034190
95		1	1	1	Washer, back tension	7002630
97		1	1	1	Lever, jump up	7034200
98		1	1	1	Lever, cassette tape detection	7034210
99		1	1	1	Lamp PC board	4612920
101		1	1	1	Cover, PC board	7002640
103		1	1	1	Screw – BMS 2.6ϕx5	850205S
104		1	1	1	Spacer, mechanism cover	7152570
105		1	1	1	Spring, slider	7441120
107		3	3	3	Screw – BFTS 2.6ϕx4	857204S
108		1	1	1	Washer, PO – reel-R	7002650
109		1	1	1	Washer, stopper	7002660
110		1	1	1	Washer, 2.6ϕ	893102S
111		1	1	1	Lamp, tape through	5801100
112		1	1	1	Solenoid	1900010
113		2	2	2	Holder, wire	7034220
114		1	1	1	Mechanism PC board	4612930
115		2	2	2	Switch, leaf	4090010

CABINET ASSEMBLY

KEY NO.	SYMBOL NO.	TYPE+ W	E	B	DESCRIPTION++	PART NO.
301a		1	1	1	Panel, front – SILVER	7885390
301b		1	1	1	Panel, front – BLACK	7885400
302a		1	1	1	Cassette cover assembly – SILVER	7870620
302b		1	1	1	Cassette cover assembly – BLACK	7870630
303a		1	1	1	Knob, input level – left, SILVER	7841400
303b		1	1	1	Knob, input level – left, BLACK	7841410
304a		1	1	1	Knob, input level – right, SILVER	7841420
304b		1	1	1	Knob, input level – right, BLACK	7841430
305a		1	1	1	Knob, output level – SILVER	7852250
305b		1	1	1	Knob, output level – BLACK	7852260
306		1	1	1	Washer, PO	7002470
307a		1	1	1	Button, push – power, SILVER	7852270
307b		1	1	1	Button, push – power, BLACK	7852280
308		1	1	1	Shaft, extension – 26.5	7401730
309a		4	4	4	Knob, selector – memory/bias fine/tape selector/NR – SILVER	7852570
309b		4	4	4	Knob, selector – memory/bias fine/tape selector/NR – BLACK	7852350
310a		1	–	–	Plate, caution – (W)	963690A
310b		–	1	1	Plate, caution – (E)	963678A
311		5	5	5	Dust cover – (A)	7002420
312		1	1	1	Dust cover – (B)	7002430
313		1	1	1	Cover, top	7821070
314		4	4	4	Foot, polyethylen	7402570
317a		1	–	–	Plate, back – W	7326680
317b		–	1	1	Plate, back – E	7326670
324		1	1	1	Tape counter assembly	7903410
325		1	1	1	Belt, counter	7903400
326		1	1	1	Filter, LED – red	7002440
329		1	1	1	Label, DIN connector	963681P
330a		1	–	–	Label, rating – (W)	963699P
330b		–	1	–	Label, rating – (E)	963697P
330c		–	–	1	Label, rating – (B)	963698P
331		1	1	1	Operation switch assembly	4090020
332		6	6	6	Screw – BFTS 3ϕx8	857308S
333		8	8	8	Screw – BFTS 3ϕx6	857306S
334		2	2	2	Screw – BFTS 3ϕx6, black	857306W
335		4	4	4	Screw – BFTS 4ϕx10, black	857410W
337		2	2	2	Screw – BFTS 4ϕx6	857406S
340		2	2	2	Screw, with washer – 3ϕx6, black	7121200
341		1	1	1	Rivet, plastic – 3ϕx3.5	7401190
342		1	1	1	Rivet, plastic – 3ϕx4.5	7401240
343		4	4	4	Rivet, plastic – 3ϕx5.5	7401260
△ 350a		1	–	–	Cord, AC line – DP-70	606007A
△ 350b		–	1	–	Cord, AC line – CEE-2T	600512A
△ 350c		–	–	1	Cord, AC line – BS	600513A
△ 351a		1	–	–	Bush, power cord – SR-3P-4	7400620
△ 351b		–	1	1	Bush, power cord – SR-4N-4	7400690
△	T1	1	–	–	Transformer, power – T-1-411 – 120V	1104110
△	T1	–	1	–	Transformer, power – T-1-409 – 220V	1104090
△	T1	–	–	1	Transformer, power – T-1-410 – 240V	1104100
△	S1	1	–	–	Switch, push – power	4041440
△	S1	–	1	1	Switch, push – power	4041670
△	C940	1	–	–	C-CAP 0.01uf AC125V	239103C
△	C940	–	1	1	C-CAP 0.01uf AC400V	239103E
△		1	–	–	Cover, power switch	7403350
	J4	1	1	1	Jack, headphones	4550290
	J901	1	1	1	Jack, remote control – 7P	4530610
	D431	1	1	1	Meter, bar graph – 30LED meter	5060260
	R419,420	1	1	1	VR 50kohm (A)x2 – input level	4330080
	D917	1	1	1	LED TLR-208 – red – record	5060240
	D918	1	1	1	LED TLY-208 – yellow – rec mute	5060250
	D919	1	1	1	LED TLG-208 – green – NR	5060230

METER PC BOARD ASSEMBLY

KEY NO.	SYMBOL NO.	TYPE+ W	E	B	DESCRIPTION++	PART NO.
	Q435	1	1	1	IC μPC339C	518083S
	Q436	1	1	1	IC TA7612AP	518115S
	Q431,432 Q437 ~Q440	6	6	6	TR 2SA1015 (GR)	510102S
	Q429,430	2	2	2	TR 2SC1815 (GR)	512107S
	Q433,434	2	2	2	TR 2SC2120 (Y)	512125S
	C492	1	1	1	E-CAP 330uF 10V	211133Q
	C493,494	2	2	2	M-CAP 0.01uF 5% 50V	222103J
	C495	1	1	1	C-CAP 0.001uF 50V	231102M
	C497	1	1	1	C-CAP 0.01uF 50V	231103Z
	R427,428	2	2	2	RES 56kohm 5% ¼W	324563V
	R429,430	2	2	2	RES 100kohm 5% ¼W	324104V
	R431,432	2	2	2	RES 1kohm 5% ¼W	324102V
	R433	1	1	1	RES 680ohm 5% ¼W	324681V
	R434	1	1	1	RES 820ohm 5% ¼W	324821V
	R435	1	1	1	RES 2.7kohm 5% ¼W	324272V
	R436 ~R438	3	3	3	RES 39kohm 5% ¼W	324393V
	R439,440	2	2	2	RES 1kohm 5% ¼W	324102V

PART ORDERING PROCEDURE -----DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	R441	1 1 1	RES 39kohm 5% ¼W	324393V
	R442	1 1 1	RES 12kohm 5% ¼W	324123V
	R443	1 1 1	RES 1.2kohm 5% ¼W	324122V
	R444	1 1 1	RES 1kohm 5% ¼W	324102V
	R445	1 1 1	RES 10kohm 5% ¼W	324103V
	R446			
	~R451	6 6 6	RES 220ohm 5% ¼W	324221V
	R452			
	~R459	8 8 8	RES 150ohm 5% ¼W	324151V
	R460	1 1 1	RES 180ohm 5% ¼W	324181V
	MAGNET SENSOR PC BOARD ASSEMBLY			
	S908	1 1 1	Switch, rotary – memory	4051330
	R467	1 1 1	VR 10kohm (B) – bias fine	4310650
	Z901	1 1 1	Magneto resistive element – DM101A	5900010
	Q920,921	2 2 2	TR 2SC1815 (GR)	512107S
	Q922	1 1 1	TR 2SA1015 (GR)	510102S
	C929,930	2 2 2	E-CAP 10uf 16V	211220Q
	C931	1 1 1	E-CAP 22uf 25V	211322Q
	R936	1 1 1	RES 470kohm 5% ¼W	324474V
	R937	1 1 1	RES 1meg.ohm 5% ¼W	324105V
	R938	1 1 1	RES 10kohm 5% ¼W	324103V
	R939	1 1 1	RES 39kohm 5% ¼W	324393V
	R940	1 1 1	RES 10kohm 5% ¼W	324103V
	R941	1 1 1	RES 33kohm 5% ¼W	324333V
	R942	1 1 1	RES 15kohm 5% ¼W	324153V
	MAIN PC BOARD ASSEMBLY			
	R413,414	1 1 1	VR 10kohm (B)x2 – output level	4321180
	S101	1 1 1	Switch, rotary – tape selector	4055220
	S102	1 1 1	Switch, rotary – NR	4055230
	J1	1 1 1	Jack, microphone – 2P	4550340
	J2	1 1 1	Terminal, RCA phono pin jack – 2Px2	4444090
	J3	1 1 1	Connector, DIN type 5P	4530600
	Z401,402	2 2 2	Filter, Dolby NR – blue	1260170
	Z403,404	2 2 2	Filter, Dolby NR – black	1260180
	L401,402	2 2 2	Coil, bias trap – 47mH	1500050
	L403,404	2 2 2	Coil, equalizing – 2.2mH	1600010
	L405	1 1 1	Coil, bias oscillator	1500060
	Q401			
	~Q404	4 4 4	FET 2SK30A (GR)	516013S
	Q405,406	2 2 2	TR 2SC2240 (BL)	512102S
	Q407,408	2 2 2	TR 2SA970 (BL)	510103S
	Q409,410	2 2 2	TR 2SC2240 (BL)	512102S
	Q411			
	~Q414	4 4 4	FET 2SK30A (GR)	516013S
	Q405,416	2 2 2	IC μA7300PC	518118S
	Q417			
	~Q420	4 4 4	FET 2SK117 (BL)	516040S
	Q421,422	2 2 2	TR 2SA1015 (GR)	510102S

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	Q423			
	~Q426	4 4 4	TR 2SC1815 (GR)	512107S
	Q427,428	2 2 2	FET 2SK30A (GR)	516013S
	Q441	1 1 1	IC μPC4559C	518110S
	Q442	1 1 1	IC TA7639P	518116S
	Q901	1 1 1	TR 2SA1015 (GR)	510102S
	Q902	1 1 1	TR 2SC1815 (GR)	512107S
	Q903	1 1 1	TR 2SA817 (Y)	510047S
	Q904,906	2 2 2	TR 2SA1015 (GR)	510102S
	Q905	1 1 1	TR 2SC2655 (Y)	512124S
	Q906,908	2 2 2	TR 2SA1015 (GR)	510102S
	Q907	1 1 1	TR 2SC1626 (Y)	515081S
	Q908	1 1 1	TR 2SA1015 (GR)	510102S
	Q909	1 1 1	TR 2SC1815 (GR)	512107S
	Q910	1 1 1	TR 2SA950 (Y)	510115S
	Q911	1 1 1	TR 2SA1020 (Y)	510122S
	Q912	1 1 1	TR 2SC2120 (Y)	512125S
	Q913	1 1 1	TR 2SC1626 (Y)	515081S
	Q914	1 1 1	TR 2SA816 (Y)	514087S
	Q915	1 1 1	TR 2SA1015 (GR)	510102S
	Q916,918,			
	Q919	3 3 3	TR 2SC1815 (GR)	512107S
	Q917	1 1 1	TR 2SC1626 (Y)	515081S
	Q923,925,			
	Q927,929			
	~Q931	7 7 7	TR 2SC1815 (GR)	512107S
	Q924,926,			
	Q928,932	4 4 4	TR 2SA1015 (GR)	510102S
	Q953	1 1 1	IC TC9121P	518117S
	D401			
	~D408	8 8 8	Diode 1S1553V	501025S
	D409			
	~D426	18 18 18	Diode 1S1555V	501021S
	D427,428	2 2 2	Zener diode 05Z6.2L	502080S
	D429	1 1 1	Diode 1S1555V	501021S
	D430,432	1 1 1	Zener diode 05Z6.2L	502080S
	D901			
	~D903	3 3 3	Diode S1VB10	560070S
	D904	1 1 1	Diode 1S1553V	501025S
	D905	1 1 1	Diode 1S5555V	501021S
	D906	1 1 1	Diode S5277B	560046S
	D907	1 1 1	Zener diode 05Z18U	502082S
	D908			
	~D912	5 5 5	Diode 1S1555V	501021S
	D913,914	2 2 2	Zener diode 05Z10U	502081S
	D915	1 1 1	Zener diode 02Z12A	502073S
	D916	1 1 1	Diode 1S1555V	501021S
	D920			
	~D931	9 9 9	Diode 1S1555V	501021S
	D932	1 1 1	Zener diode 05Z6.2L	502080S
	D938	1 1 1	Diode 1S1555V	501021S
	C401,402	2 2 2	C-CAP 5pf 50V	232509D
	C403,404	2 2 2	C-CAP 22pf 10% 50V	232220K
	C405,406	2 2 2	C-CAP 150pf 10% 50V	232151K
	C407,408	2 2 2	C-CAP 390pf 10% 50V	232391K
	C409,410	2 2 2	C-CAP 150pf 10% 50V	232151K
	C411,412	2 2 2	E-CAP 33uf 16V	211223Q
	C413,414	2 2 2	C-CAP 22pf 10% 50V	232220K
	C415,416	2 2 2	E-CAP 1uf 50V	211510Q
	C417,418	2 2 2	M-CAP 0.01uf 5% 50V	222103J
	C419,420	2 2 2	E-CAP 47uf 10V	211125Q
	C421,422	2 2 2	E-CAP 0.68uf 50V	211507Q
	C423,424	2 2 2	E-CAP 47uf 10V	211125Q
	C425,426	2 2 2	M-CAP 0.0047uf 5% 50V	222472J
	C427			
	~C430	4 4 4	E-CAP 4.7uf 50V	211515Q
	C431,432	2 2 2	E-CAP 10uf 16V	211220Q
	C433,434	2 2 2	E-CAP 0.15uf 50V	222154M
	C435,436	2 2 2	E-CAP 1uf 50V	211510Q
	C437,438	2 2 2	M-CAP 0.027uf 5% 50V	222273J
	C439,440	2 2 2	M-CAP 0.01uf 5% 50V	222103J

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KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	C441,442	2 2 2	M-CAP 0.068uf 5% 50V	222683J
	C443,444	2 2 2	M-CAP 0.022uf 5% 50V	222223J
	C445,446	2 2 2	M-CAP 0.0068uf 5% 50V	222682J
	C447,448	2 2 2	E-CAP 470uf 6.3V	211035Q
	C449,450	2 2 2	E-CAP 22uf 25V	211322Q
	C451,452	2 2 2	M-CAP 0.033uf 5% 50V	222333J
	C453,454	2 2 2	M-CAP 0.0047uf 5% 50V	222472J
	C455,456	2 2 2	M-CAP 0.033uf 5% 50V	222333J
	C457,458	2 2 2	E-CAP 1uf 50V	211510Q
	C459,460	2 2 2	E-CAP 0.1uf 50V	211501Q
	C461,462	2 2 2	E-CAP 0.33uf 50V	211503Q
	C463,464	2 2 2	E-CAP 1uf 50V	211510Q
	C465,466	2 2 2	E-CAP 47uf 10V	211125Q
	C467,468	2 2 2	C-CAP 220pf 10% 50V	232221K
	C469,470	2 2 2	E-CAP 0.68uf 50V	211507Q
	C471,472	2 2 2	E-CAP 10uf 16V	211220Q
	C473,474	2 2 2	E-CAP 47uf 10V	211125Q
	C475,476	2 2 2	E-CAP 100uf 10V	211130Q
	C479,480	2 2 2	E-CAP 3.3uf 50V	211513Q
	C483,484	2 2 2	E-CAP 1uf 50V	211510Q
	C485,486	2 2 2	E-CAP 47uf 10V	211125Q
	C487,488	2 2 2	E-CAP 220uf 10V	211132Q
	C489,490	2 2 2	E-CAP 47uf 16V	211225Q
	C491	1 1 1	E-CAP 47uf 25V	211325Q
	C498	1 1 1	E-CAP 22uf 25V	211322Q
	C499,500	2 2 2	C-CAP 100pf 10% 50V	232101K
	C501,502	2 2 2	C-CAP 82pf 10% 50V	232820K
	C503,504	2 2 2	C-CAP 390pf 10% 50V	232391K
	C507,508	2 2 2	M-CAP 0.0056uf 5% 50V	222562J
	C509,510	2 2 2	C-CAP 0.001μf 20% 50V	231102M
	C511			
	~C514	4 4 4	C-CAP 0.0022uf 10% 50V	231222K
	C515,516	2 2 2	C-CAP 150pf 10% 50V	232151K
	C901	1 1 1	E-CAP 1000uf 16V	211240Q
	C902	1 1 1	E-CAP 3.3uf 50V	211513Q
	C903	1 1 1	E-CAP 4.7uf 50V	211515Q
	C904	1 1 1	E-CAP 1000uf 35V	211440Q
	C905,906	2 2 2	E-CAP 1000uf 25V	211340Q
	C907			
	~C909	3 3 3	E-CAP 100uf 16V	211230Q
	C910	1 1 1	E-CAP 100uf 35V	211430Q
	C911			
	~C914	4 4 4	E-CAP 100uf 16V	211230Q
	C915	1 1 1	E-CAP 0.33uf 50V	211503Q
	C916	1 1 1	E-CAP 33uf 25V	211323Q
	C917	1 1 1	E-CAP 47uf 10V	211125Q
	C918			
	~C920	3 3 3	M-CAP 0.0068uf 5% 50V	222682J
	C921	1 1 1	C-CAP 0.01uf 50V	231103Z
	C922	1 1 1	S-CAP 3900pf 10% 200V	272392K
	C923	1 1 1	E-CAP 10uf 50V	211520Q
	C924	1 1 1	E-CAP 10uf 16V	211230Q
	C925	1 1 1	E-CAP 220uf 10V	211132Q
	C926	1 1 1	E-CAP 47uf 50V	211525Q
	C927	1 1 1	E-CAP 10uf 16V	211220Q
	C928	1 1 1	C-CAP 0.01uf 50V	231103Z
	C932	1 1 1	E-CAP 3.3uf 50V	211513Q
	C937	1 1 1	E-CAP 1uf 50V	211510Q
	C939	1 1 1	E-CAP 4.7uf 50V	211515Q
	C943	1 1 1	E-CAP 10uf 16V	211220Q
		1 1 1	Potentiometer 300ohm	4301420
		2 2 2	Potentiometer 20kohm	4301430
		4 4 4	Potentiometer 50kohm	4301240
		2 2 2	Potentiometer 200kohm	4301230
	R407,408	2 2 2	RES 3.3kohm 5% ¼W	324332J
	R411,412	2 2 2	RES 2.2meg.ohm 5% ¼W	324225V
	R415,416	2 2 2	RES 82ohm 5% ¼W	324820J
	R421,422	2 2 2	RES 330ohm 5% ¼W	324331J
	R423,424	2 2 2	RES 10meg.ohm 5% ¼W	324106V
	R425,426	2 2 2	FP-MO-RES 68ohm 5% 2W	362680L
	R461	1 1 1	FP-MO-RES 100ohm 5% 1W	361101L

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	R462	1 1 1	RES 18kohm 5% ¼W	324183V
	R463	1 1 1	RES 220kohm 5% ¼W	324224V
	R464	1 1 1	RES 47kohm 5% ¼W	324473V
	R465,466	2 2 2	RES 1kohm 5% ¼W	324102J
	R468	1 1 1	RES 560ohm 5% ¼W	324561V
	R901	1 1 1	RES 10kohm 5% ¼W	324103V
	R902	1 1 1	RES 1.5meg.ohm 5% ¼W	324155J
	R903	1 1 1	RES 1kohm 5% ¼W	324102V
	R904	1 1 1	RES 820ohm 5% ¼W	324821V
	R905	1 1 1	RES 5.6kohm 5% ¼W	324562V
	R906	1 1 1	RES 1kohm 5% ¼W	324102V
	R907	1 1 1	RES 10kohm 5% ¼W	324103V
	R908	1 1 1	RES 1kohm 5% ¼W	324102V
	R910	1 1 1	RES, fusible 56ohm 5% 1W	356560J
	R911	1 1 1	RES, 470ohm 5% ¼W	324471J
	R913	1 1 1	RES 1.5kohm 5% ¼W	324152V
	R914	1 1 1	RES 2.2kohm 5% ¼W	324222V
	R915	1 1 1	RES 680ohm 5% ¼W	324681V
	R916	1 1 1	RES 1.5kohm 5% ¼W	324152V
	R917	1 1 1	RES 270ohm 5% ¼W	324271V
	R918	1 1 1	RES, fusible 22ohm 5% ½W	355220J
	R919	1 1 1	RES 150ohm 5% ½W	329151J
	R920	1 1 1	RES 390ohm 5% ¼W	324391W
	R921	1 1 1	RES 1.5kohm 5% ¼W	324152V
	R922	1 1 1	RES, fusible 2.2ohm 5% ¼W	354228J
	R923	1 1 1	RES 150ohm 5% ½W	329151J
	R924	1 1 1	RES 120ohm 5% ¼W	324121J
	R925	1 1 1	RES, fusible 2.2ohm 5% ¼W	354228J
	R926	1 1 1	RES 120ohm 5% ¼W	324121J
	R927	1 1 1	RES 150ohm 5% ½W	329151J
	R928	1 1 1	RES 1kohm 5% ¼W	324102V
	R929	1 1 1	RES 270ohm 5% ½W	329271J
	R930	1 1 1	RES 330ohm 5% ¼W	324331J
	R931	1 1 1	RES 470ohm 5% ¼W	324471J
	R932	1 1 1	RES 2.2kohm 5% ¼W	324222J
	R933	1 1 1	RES 560ohm 5% ¼W	324561J
	R934,935	2 2 2	RES 4.7ohm 5% ¼W	324478V
	R943	1 1 1	RES, fusible 2.2ohm 5% ¼W	354228J
	R944	1 1 1	RES 100kohm 5% ¼W	324104V
	R945	1 1 1	RES 4.7kohm 5% ¼W	324472J
	R946	1 1 1	RES 47kohm 5% ¼W	324473V
	R947	1 1 1	RES 12kohm 5% ¼W	324123J
	R948	1 1 1	FP-MO-RES 150ohm 5% 1W	361151L
	R949	1 1 1	RES 270ohm 5% ¼W	324271J
	R950	1 1 1	RES 220ohm 5% ¼W	324221J
	R951	1 1 1	RES 180ohm 5% ¼W	324181J
	R952,953	2 2 2	RES 220ohm 5% ¼W	324221J
	R954	1 1 1	RES 120ohm 5% ¼W	324121J
	R955	1 1 1	RES, fusible 1ohm 5% ¼W	354108J
	PACKING MATERIALS & ACCESSORIES			
		1 1 1	Carton box	9825860
		2 2 2	Pad	9840940
		1 1 1	Sack, polyethylen cloth	9640770
		1 – –	Manual, instruction – E	960338E
		– 1 1	Manual, instruction – K	960338K
		1 – –	Card, warranty – U.S.A.	967043A
		1 – –	Card, warranty – Canada	9670420
		1 – –	List, service stations	9690210
		1 – –	Manual, safety instruction	9670410
		2 2 2	Cord, RCA phono pin plug	962018A
		1 1 1	Stick, head cleaning	9690200

SEMICONDUCTOR DATA,

TRANSISTORS

† NOTES Ge: Germanium Si : Sillicon

A : Alloy B : Base D : Diffused Dd : Double-diffused

Df : Drift-field E : Epitaxial G : Grown J : Junction

M : Mesa P : Planer Pc : Point-contact Td : Triple-diffused

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute-Maximum Values: (T_A = 25°C unless otherwise specified)					ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)												MANUFACTURER
			Collector-to-Base Voltage V_{CBO} (V)	Emitter-to-Base Voltage V_{EBO} (V)	Collector Current I_C (mA)	Collector Dissipation P_C (mW)	Junction Temperature T_J (°C)	Collector Cutoff Current I_{CBO} (uA)	V_{CB} (V)	Static Forward-Current Transfer Ratio h_{FE}	V_{CE} (V)	I_C (mA)	Collector-Emitter Saturation Voltage $V_{CE(sat)}$ (V)	I_C (mA)	I_B (mA)	Gain-Bandwidth Product f_T $f_{\alpha b}$* (MHz)	V_{CE} V_{CB}* (V)	I_E I_C* (mA)	Output Capacitance C_{ob} (pF)	Others	
2SA816 (Y)	AF Power amp.	PNP Si-E	−80	−5	−750	1.5W	150	−0.5 max.	−30	120 ~ 240	−2	−150	−0.5 max.	−500	−50	100	−2	−150*	20		TOSHIBA
2SA817 (Y)	AF Voltage amp.	PNP Si-E	−80	−5	−300	600	150	−0.01 max.	−50	120 ~ 240	−2	−50	−0.4 max.	−200	−20	100	−10	−10*	14		TOSHIBA
2SA950 (Y)	AF Power amp.	PNP Si-E	−35	−5	−800	600	150	−0.01 max.	−35	160 ~ 320	−1	−100	−0.7 max.	−500	−20	120	−5	−10*	19		TOSHIBA
2SA970 (BL)	AF Low noise	PNP Si-E	−120	−5	−100	300	125	−0.01 max.	−120	350 ~ 700	−6	−2	−0.3 max.	−10	−1	100	−6	−1*	4		TOSHIBA
2SA1015 (GR)	AF Driver	PNP Si-E	−50	−5	−150	400	125	−0.1 max.	−50	200 ~ 400	−6	−2	−0.3 max.	−100	−10	80 min.	−10	−1*	7 max.		TOSHIBA
2SA1020 (Y)	AF Power amp.	PNP Si-E	−50	−5	2A	900	150	−1.0 max.	−50	120 ~ 240	−2	−500	−0.5 max.	−1A	−50	100	−2	−500*	40		TOSHIBA
2SC1626 (Y)	AF Power amp.	NPN Si-E	80	5	750	1.5W	150	0.5 max.	30	120 ~ 240	2	150	0.5 max.	500	50	100	2	150*	15		TOSHIBA
2SC1815 (GR)	AF Driver	NPN Si-E	60	5	150	400	125	0.1 max.	60	200 ~ 400	6	2	0.25 max.	100	10	80 min.	10	1*	3 max.		TOSHIBA
2SC2120 (Y)	AF Power amp.	NPN Si-E	35	5	800	600	150	−0.01 max.	35	160 ~ 320	1	100	0.5 max.	500	20	120	5	10*	13		TOSHIBA
2SC2240 (BL)	AF Low noise	NPN Si-E	120	5	100	300	125	−0.01 max.	120	350 ~ 700	6	2	0.3 max.	10	1	100	6	1*	3		TOSHIBA
2SC2655 (Y)	AF Power amp.	NPN Si-E	50	5	2A	900	150	1.0 max.	50	120 ~ 240	2	500	0.5 max.	1A	50	100	2	500*	30		TOSHIBA

FIELD EFFECT TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE †	MAXIMUM RATINGS Absolute-Maximum Values: (T_A = 25°C unless otherwise specified)						ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25° C unless otherwise specified)															MANUFACTURER
			Gate-to-Drain Voltage V_{GDS} (V)	Gate-to-Source Voltage V_{GSO} (V)	Gate Current I_G (mA)	Drain Current I_D (mA)	Total Dissipation P_D (mW)	Channel Temperature T_{ch} (°C)	Gate Leak Current Test Conditions	Gate Leak Current I_{GSS} (nA)	Gate to Drain Breakdown Voltage Test Conditions	Gate to Drain Breakdown Voltage $V_{(BR)GDO}$ (V)	Drain Current Test Conditions	Drain Current I_{DSS} (mA)	Gate to Source Cutoff Voltage Test Conditions	Gate to Source Cutoff Voltage $V_{GS(off)}$ (V)	Forward Transfer Admittance Test Conditions	Forward Transfer Admittance $\|Y_{fs}\|$ (mS)	Feed Back Capacitance Test Conditions	Feed Back Capacitance C_{rss} (pF)	Power Gain (Common Source) Test Conditions	Power Gain (Common Source) G_{PS} (dB)	Noise Figure Test Conditions	Noise Figure NF (dB)	
2SK-30A (GR)	AF Low noise	Si N-channel Junction	−50		10		100	125	V_{GS} =−30V V_{DS}=0	−1 max.	I_G =−100μA V_{DS}=0	−50 min.	V_{DS} =10V V_{GS}=0	2.6 ~ 6.5			V_{DS} =10V V_{GS}=0 f=1kHz	1.2 min.					V_{DS} =15V V_{GS}=0 f=120Hz	5 max.	TOSHIBA
2SK-117 (BL)	AF Low noise	Si N-channel Junction	−50		10		300	125	V_{GS} =−30V V_{DS}=0	−1 max.	I_G =−100μA V_{DS}=0	−50 min.	V_{DS} =10V V_{GS}=0	6 ~ 14			V_{DS} =10V V_{GS}=0 f=1kHz	4.0 min.					V_{DS} =10V I_D =0.5mA f=1kHz	2 max.	TOSHIBA

DIODES, LED'S

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (T_A = 25°C unless otherwise specified)									ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)							MANUFACTURER
			Reverse Surge Voltage V_{Rsurge} (V)	Peak Reverse Voltage V_{RM} (V)	Reverse Voltage V_R (V)	Peak Forward Voltage V_{FM} (V)	Peak Forward Current I_{FM} (mA)	Average Rectified Current I_O (mA)	Forward Surge Current $I_{F\,surge}$ (A)	Junction Temperature T_J (°C)	Total Power Dissipation P_D (mW)	Forward Current I_{Fmin} (mA)	Forward Current Test Condition V_F (V)	Forward Voltage V_{Fmax} (V)	Forward Voltage Test Condition I_F (mA)	Reverse Current I_{Rmax} (uA)	Reverse Current Test Condition V_R (V)	Others	
1S1553V	General	Si-EP		70				100	1	150	100	100	1.4			0.5	60		TOSHIBA
1S1555V	General	Si-EP		35				100	1	150	100	100	1.4			0.5	30		TOSHIBA
S5277B	Rectifier	Si-DJ		100			2.0A	1.0A	50	150				1.2	1.0A	10	100		TOSHIBA
S1VB10	Rectifier	Si-DJ (Bridge)		100				600	15	150				1.05	300	10	100		SHINDENGEN
TLG-208	Lamp (Green)	GaP			4			I_F= 25mA		75	70			2.8	20	5	4	I_V=0.6 mcd (I_F=15 mA)	TOSHIBA
TLR-208	Lamp (Red)	Gap			4			I_F= 25mA		75	56			2.8	20	5	4	I_V=0.5 mcd (I_F=15 mA)	TOSHIBA
TLY-208	Lamp (Yellow)	GaP			4			I_F= 25mA		75	70			2.8	20	100	4	I_V=0.6 mcd (I_F=15 mA)	TOSHIBA

ZENER DIODES

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (T_A = 25°C unless otherwise specified)			ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)														MANUFACTURER
			Total Power Dissipation P_D (mW)	Zener Current I_Z (mA)	Junction Temperature T_J (°C)	Zener Voltage V_Z MIN (V)	V_Z TYP (V)	V_Z MAX (V)	V_Z Test Conditions I_Z (mA)	Differential Resistance r_Z TYP (Ω)	r_Z MAX (Ω)	r_Z Test Conditions I_Z (mA)	Temperature Coefficient γ_Z TYP (%/°C)	γ_Z MAX (%/°C)	γ_Z Test Conditions I_Z (mA)	Reverse Current I_Z (μA)	Reverse Current Test Conditions V_R (V)	Others	
05Z6.2L	Regulator	Si-P	500	76	175	5.8		6.3	5	5	15	5	0.042	0.060	5	1	3		TOSHIBA
05Z10U	Regulator	Si-P	500	46	175	10.0		10.6	5	15	25	5	0.070	0.085	5	0.5	8		TOSHIBA
02Z12A	Regulator	Si-P	250	19	175	11.4		12.6	5	27	50	5	0.077	0.090	5	2	9		TOSHIBA
05Z18U	Regulator	Si-P	500	24	175	18.0		19.1	5	30	40	5	0.092	0.099	5	0.5	14		TOSHIBA

INTEGRATED CIRCUIT TC9121P

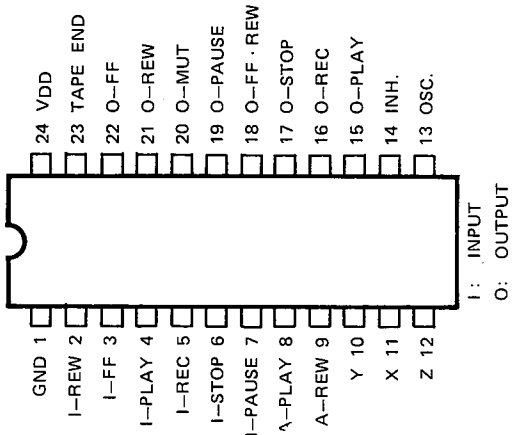
- **APPLICATION: TAPE DECK CONTROLLER**
- **MANUFACTURER: TOSHIBA**

ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD}	0 ~ 10	V
Input Voltage	V_{IN}	−0.3~V_{DD}+0.3	V
Power Dissipation	Pc	800	mW
Output Current	Iout	* 30	mA
Operating Temperature	Topr	−30 ~ 70	°C
Storage Temperature	Tstg	−55 ~ 125	°C

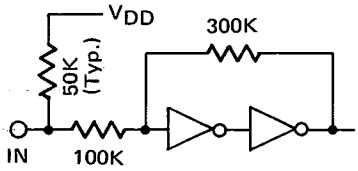
* - - - Without O–MUTE terminal.

TERMINAL GUIDE (TOP VIEW)

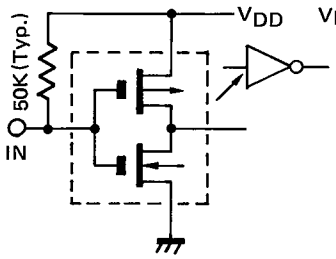


IN/OUT TERMINAL'S EQUIVALENT CIRCUIT

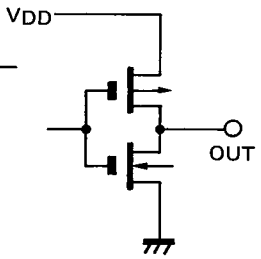
"Z" input (Schmidt trigger)



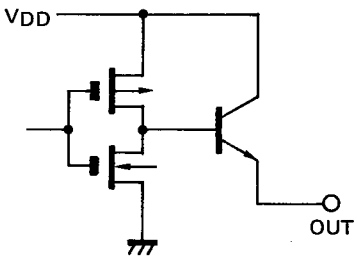
Without "Z" input



"O–MUTE" output



Without "O–MUTE" output



TRUTH TABLE

INPUT / OUTPUT	STOP	FF	REW	PLAY	REC & PLAY	PAUSE		
						STOP →	PLAY →	REC & PLAY →
O–PLAY	L	L	L	H	H	L	L	L
O–REC	L	L	L	L	H	L	L	H
O–STOP	L	H	H	H	H	H	H	H
O–FF · REW	L	H	H	L	L	L	L	L
O–PAUSE	L	L	L	L	L	H	H	H
O–MUT	H	H	H	L	L	H	L	L
O–REW	L	L	H	L	L	L	L	L
O–FF	L	H	L	L	L	L	L	L
TAPE END	H	H	H	H	H	H	H	H
MODE NAME	STOP	FAST FWD.	RE-WIND	PLAY	RECORD	PAUSE	PLAY PAUSE	RECORD PAUSE

INTEGRATED CIRCUITS μA7300PC

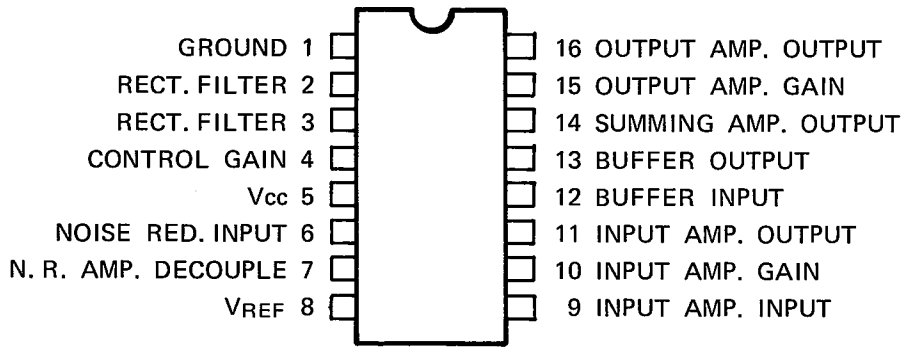
- **APPLICATION: DOLBY B–TYPE NOISE REDUCTION PROCESSOR**
- **MANUFACTURER: FAIRCHILD**

ELECTRICAL CHARACTERISTICS

(T_A=25°C, V^+=12V, Input amplifier gain=10dB, source impedance less than 10K, output amplifier gain=17.7dB (Output Level equals 775mV for Dolby Level), encode mode, 0dB=100mV_{rms} at test point unless otherwise specified.

CHARACTERISTICS	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Operating Voltage Range			10		20	V
Supply Current				11	20	mA
Input Amplifier Current (Pins 10-11)				6		μA
Output Amplifier Current (Pins 15-16)				13		μA
Total Harmonic Distortion (Pin 16)	0 dB at Pin 13	f = 20–20,000 Hz		.04	0.1	%
	+10 dB at Pin 13	f = 1 kHz		0.1	0.3	%
Signal Handling (Pin 16)	THD = 1.0%	R_L = 2 kΩ		6.4		Vpk–pk
Signal Handling (Pin 14)	THD = 1.0%		20			dB
Signal to Noise Ratio (Pin 16)	CCIR/ARM Weighting Noise Reduction (ON)	ENCODE	65	68		dB
Noise Level Relative to Dolby Level		DECODE	75	78		dB
Encode Mode Frequency Response	f = 1.4 kHz Input at Pin 9	0 dB	−1	0	+1	dB
		−20 dB	−17.1	−15.6	−14.1	dB
		−30 dB	−24.0	−22.5	−21.0	dB
	f = 5 kHz Input at Pin 9	0 dB	−0.7	+0.3	+1.3	dB
		−20 dB	−18.3	−16.8	−15.3	dB
		−30 dB	−23.3	−21.8	−20.3	dB
		−40 dB	−29.0	−29.7	−30.2	dB
	f = 20 kHz Input at Pin 9	0 dB	−0.3	+0.7	+1.7	dB
		−20 dB	−18.8	−17.3	−15.8	dB
		−30 dB	−25.0	−23.5	−22.0	dB
		−40 dB	−29.0	−29.7	−30.2	dB
Back-to-Back Frequency Response	f = 20 – 20 kHz with respect to standard	+10 dB	−1.0		+1.0	dB
		0 dB	−1.0		+1.0	dB
		−10 dB	−1.0		+1.0	dB
		−20 dB	−1.5		+1.5	dB
		−30 dB	−1.5		+1.5	dB
		−40 dB	−0.5		+0.7	dB
Reference Voltage	I_8 = −100 μA		6.0	6.6	7.2	V
Input Resistance	Pin 9		50	100		kΩ
Input Resistance	Pin 12		50	100		kΩ
Voltage Gain	Pin 12 to Pin 13:	f = 1 kHz		0		dB
Voltage Gain	Pin 12 to Pin 14:	f = 1 kHz		0		dB
Power Supply Ripple Rejection	f_R = 120 Hz			−45		dB

TERMINAL GUIDE (TOP VIEW)



INTEGRATED CIRCUITS TA7639P

- **APPLICATION: TAPE DECK'S AMPLIFIER**
- **MANUFACTURER: TOSHIBA**

ABSOLUTE MAXIMUM RATINGS

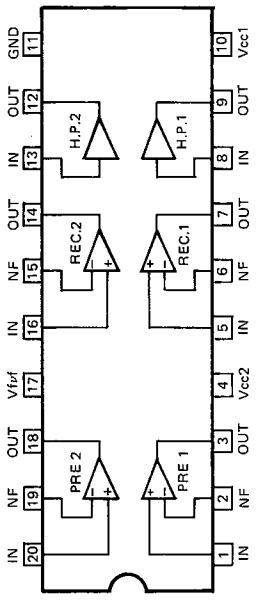
ITEM	SYMBOL	RATING	UNIT
Supply Voltage	Vcc	14	V
Power Dissipation	PD	890	mW
Operating Temperature	Topt	−20 ~ 65	°C
Storage Temperature	Tstg	−55 ~ 150	°C

PRE 1, 2: LOW NOISE AMPLIFIER (G_{vo} = 85 dB)
(FOR MIC AMP. EQ AMP. etc.)

REC 1, 2: GENERAL USE AMPLIFIER (G_{vo} = 47 dB)
(FOR RECORDING AMP. LINE AMP.)

H.P. 1, 2: FIXED GAIN AMPLIFIER (G_v = 15.5 dB)
(FOR HEADPHONE AMP.)

TERMINAL GUIDE (TOP VIEW)



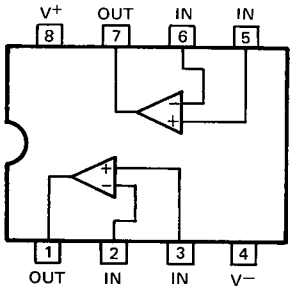
INTEGRATED CIRCUITS μPC4559C

- **APPLICATION: DUAL OPERATIONAL AMPLIFIER**
- **MANUFACTURER: NEC**

ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Supply Voltage	V+ ~ V−	36	V
Total Power Dissipation	PT	350	mW
Differential Input Voltage	VID	±30	V
Input Voltage	VICM	±15	V
Operating Temperature	Topt	0 ~ 70	°C
Storage Temperature	Tstg	−55 ~ 125	°C

TERMINAL GUIDE (TOP VIEW)



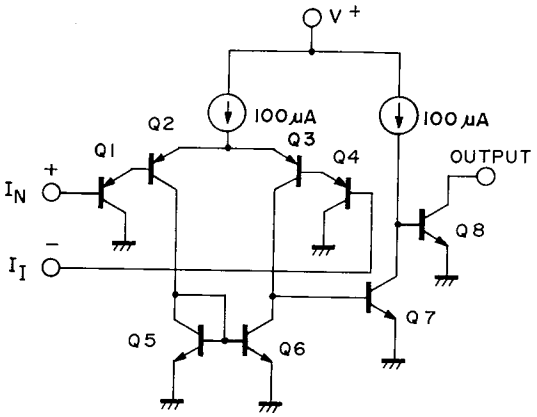
INTEGRATED CIRCUITS μPC339C

- APPLICATION: QUAD COMPARATOR
- MANUFACTURER: NEC

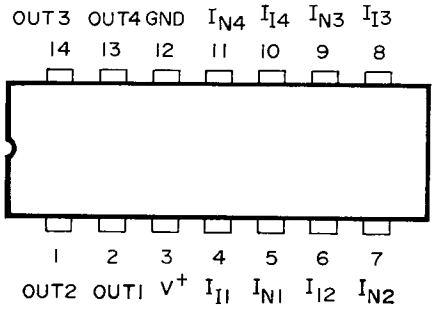
ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Supply Voltage	Vs	36	V
Differential Input Voltage	VID	36	V
Common Mode Input Voltage	VICM	−0.3 ~ +36	V
Power Dissipation	PT	570	mW
Operating Temperature	Topt	0 ~ +70	°C
Storage Temperature	Tstg	−55 ~ +125	°C

EQUIVALENT CIRCUIT (1/4 CIRCUIT)



TERMINAL GUIDE (TOP VIEW)



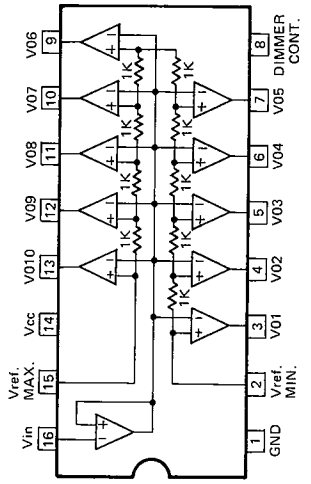
INTEGRATED CIRCUIT TA7612AP

- APPLICATION: LED LEVEL METER DRIVER
- MANUFACTURER: TOSHIBA

ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	RATING	UNIT
Supply Voltage	Vcc	20	V
Power Dissipation	PD	750	mW
Operating Temperature	Topt	−30 ~ 70	°C
Storage Temperature	Tstg	−65 ~ 125	°C

TERMINAL GUIDE (TOP VIEW)



SPECIFICATIONS

MECHANICAL

Tape Type: . . . . . Philips type compact cassette tape
Track System: . . . . . 4 track 2 channel stereo
Heads, (Recording & Playback): . . . . . Sendust Head
(Erasing): . . . . . 4 gap Ferrite Head
Motors, (Capstan Drive): . . . . . DC servo motor
(Reel Drive): . . . . . DC motor

Control System: . . . . . Full IC logic control
Tape Speed: . . . . . 4.8 cm/sec. (1 7/8 ips) ±2% or less
Fast Winding Time: . . . . . Less than 75 sec. for C-60 tape
Wow & Flutter: . . . . . Less than 0.1% (WTD RMS)

ELECTRICAL (0 dB = 160 nwb/m)

Output Level/Loading Resistance,
(Line): . . . . . 450 mV/50 Kohms
(Headphone): . . . . . 90 mV/8 ohms
(DIN): . . . . . 450 mV/50 Kohms
Input Sensitivity/Input Impedance,
(Line): . . . . . 50 mV/50 Kohms
(Mic): . . . . . 0.25 mV/2.2 Kohms
(DIN): . . . . . 0.25 mV/2.2 Kohms
Signal to Noise Ratio (Overall, WTD, Dolby level)
(Line, CrO_2 tape): . . . . . Better than 49 dB
Distortion (Overall, CrO_2 tape, 315 Hz 0 dB):
. . . . . Less than 2 %

Frequency Response (Overall, –20 dB input)
(Metal tape): . . . . . 40 ~ 19,000 Hz
(CrO_2 tape): . . . . . 40 ~ 17,000 Hz
(FeCr tape): . . . . . 40 ~ 17,000 Hz
(Normal tape): . . . . . 40 ~ 15,000 Hz
Crosstalk (1 kHz, +13 dB): . . . . . Better than 50 dB
Separation (1 kHz, +13 dB): . . . . . Better than 30 dB
Erasing Ratio (1 kHz, +13 dB): . . . . . Better than 60 dB
Residual Hum and Noise: . . . . . Less than 3 mV
Bias Frequency: . . . . . 85 kHz

GENERAL

Power Requirement,
NK-STD TYPE: . . . . . AC220V 50 Hz
W-TYPE: . . . . . AC120V 60 Hz
ENGLAND TYPE: . . . . . AC240V 50 Hz
Power Consumption: . . . . . 20 W

Dimensions (Width): . . . . . 420 mm (16-1/2 inches)
(Height): . . . . . 120 mm (4-3/4 inches)
(Depth): . . . . . 282 mm (11 inches)
Weight, without package: . . . . . 6 Kg (13.2 lbs)

Specifications are subject to change without notice.
*Noise reduction system manufactured under licence from Dolby Laboratories.
"Dolby" and the double-D symbol are trade marks of Dolby Laboratories.

MEMO

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